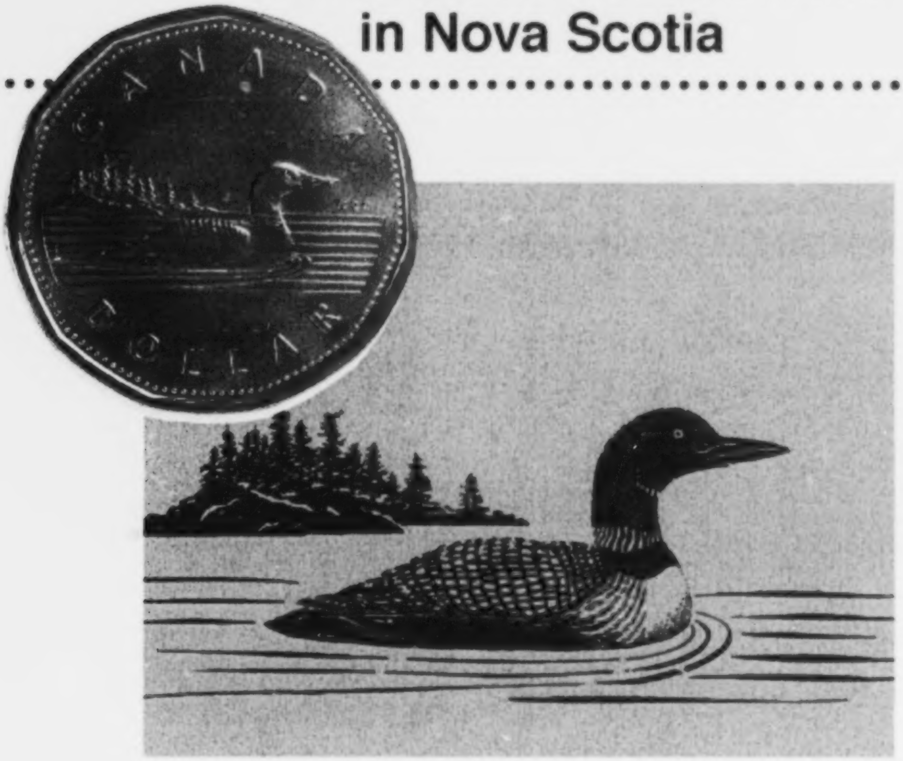
Pollution Prevention Workbook for Business in Nova Scotia



Eco-Efficiency Centre
Committed to Excellence and Efficiency

NOVA SCOTIA
Environment and Labour

106-05440/

Introduction

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Pollution Prevention, Water and Wastewater in your Business
Eliminating and Reducing Chemicals in your Business
Solid Waste Reduction and Resource Recovery in your Business
Efficient Energy Use in your Business

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This manual is not intended to contain a complete statement of the law in the area of pollution prevention or the environment. This manual does not replace reading the legislation and regulations. Amendments may be made to the legislation or regulations after the publication of this manual and reference should be made to the most recent official version of the legislation and regulations. Anyone needing specific advice on his/her own situation should seek advice from a lawyer or an environmental expert. Examples and interpretations given are not binding on the Crown.

Acknowledgments

The *Pollution Prevention Workbook for Business in Nova Scotia* was commissioned by Nova Scotia Environment and Labour and Environment Canada and authored by the Eco-Efficiency Centre.

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Canadian Centre for Pollution Prevention
Resource Recovery Fund Board
Service Nova Scotia and Municipal Relations
Nova Scotia Department of Energy
University College of Cape Breton
Nova Scotia Power Inc.
Environment Canada
Eco-Efficiency Centre
Nova Scotia Environment and Labour
Daisy Kidston and Christine Ann Smith, MES students at Dalhousie University
Alberta Department of Environment

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Pollution Prevention Workbook for
Business in Nova Scotia

MODULE 1

Introduction to Pollution Prevention

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February 2003

Introduction to Pollution Prevention
Module 1

1.1 Introduction

How small and medium-sized businesses manage environmental issues has been undergoing rapid change in Nova Scotia as businesses are faced with restrictions on what can be sent to landfills, what chemicals can be used and what can go down drains. While many businesses struggle to comply with these new restrictions, some have embraced them as opportunities to improve performance. And some businesses have reached the leading edge of environmentally responsible companies across the country.

These companies have a different attitude towards dealing with pollution, whether it is solid waste, emissions into the workplace/atmosphere, or effluents destined for sewers. The company owners/managers and their staff understand the advantages that result from changing workplace practices, behaviours, and technologies, and that it really just makes "good business sense" to improve their environmental performance. Many are using a **Pollution Prevention** approach, reducing pollution at the source, to improve their performance.

Pollution prevention (or P2 as it sometimes called) can have many benefits for business, including:
- Reduced operating costs and increased efficiency
- Reduced compliance cost and reduced exposure to future liability costs
- Reduced risks leading to improved insurance and creditworthiness
- Increased environmental protection and resource conservation
- Improved workplace environment and improved worker safety
- Enhanced public image
- Greater competitiveness

Every business, indeed every human activity, creates some waste or pollution - from the one-person home office to the corporate giants that employ thousands of people. A recent study by the Greater Vancouver Regional District revealed that businesses and buildings represent about 1/3 of water consumption, over ¾ of key wastewater pollutants, about ½ of air pollution, and ¾ of municipal solid wastes. Overall, 1/3 of all energy and natural resource consumption was simply for the construction and operation of buildings.[1]

The inefficient use of energy, material and water resources has far-reaching implications for the competitiveness of Canadian business in general. We fall behind many countries in terms of the efficient use of our resources, which is a key part of competitiveness. To be more competitive, increasing efficiency has to be an important goal for business and government.

Companies in Nova Scotia are changing the way they do business!

A bus company changes how it washes its bus components, changing from a solvent parts washer to a hot water parts washer. It eliminates the use of harmful solvents. The company can buy biodegradable detergents at a lower cost than the solvents, and it avoids the high cost of disposing of the solvents after they are used.

An autobody repair shop uses more environmentally friendly painting practices. These include using high volume, low pressure spray guns reducing the wastage of paint, installing an enclosed downdraft paint booth which prevents paint fumes from escaping into the rest of the shop, and switching to water-based paints (reducing volatile organic compounds (VOCs)).

A supplier/distributor of automotive parts reduces disposal costs and increases revenues from selling recyclable materials. How? Inventory control, rethinking their packaging processes, and segregating their wastes carefully.

Small and medium-sized enterprises (SMEs) are a significant feature of our economy and their activities have a significant impact on the environment. In Canada, 98% of businesses employ fewer than 100 people and 75% of businesses have fewer than 10 employees[2]. Consequently, this sector also has an important role to play in protecting the environment. In most cities and towns, you will often find businesses clustered together, environmental impacts can be very pronounced.

The US National Academy of Engineering estimates that 93% of the materials which go into the production of consumer goods end up as waste before the goods are even sold![3]

This "Pollution Prevention Workbook for Businesses in Nova Scotia" has been designed to introduce small and medium-sized businesses to pollution prevention and assist you to make pollution prevention part of their day-to-day decision making - in effect, to help companies realize that pollution prevention efforts simply make "good business sense"!

1.2 What is pollution prevention?

Pollution prevention is an approach that any size or type of organization can use to protect the environment, increase efficiency and save money. In its simplest explanation, it is captured by the familiar saying, "an ounce of prevention is worth a pound of cure". If a company doesn't create pollution or waste, it doesn't have to devote time and resources to storing, handling, transporting, treating or disposing of it. Pollution prevention includes conserving water and energy, "green" purchasing, efficient use of raw materials, replacing hazardous products with less hazardous ones, and modifying processes to reduce waste and pollution. It also includes low cost and simple solutions such as good housekeeping and preventative maintenance. If you conduct activities in your organization that avoid creating waste or pollutants, then you are already using pollution prevention solutions. If your organization avoids creating waste or pollutants then you are already using pollution prevention practices.

"Pollution equals inefficiency. When scrap, harmful substances, or energy forms are discharged into the environment as pollution, it is a sign that resources have been used incompletely, inefficiently, or ineffectively."[4]

Michael Porter and
Claas van der Linde
The Harvard Business Review

Pollution prevention does not include off-site recycling and recovery; waste treatment; concentration of hazardous waste; dilution of waste; transfer of waste from one medium to another. Pollution prevention options should be considered prior to looking at disposal and treatment methods.

In Canada, pollution prevention refers to "the use of processes, practices, materials, products or energy that avoid or minimize the creation of pollutants and wastes, at the source."[5]. The Nova Scotia Department of Environment and Labour has also adopted this definition.

It just makes "good business sense" to improve your environmental performance.

In Nova Scotia, the Environment Act prioritizes the principle of pollution prevention and waste reduction as the foundation for long term environmental protection. Pollution prevention objectives are also found in the Canadian Environmental Protection Act (CEPA), administered by Environment Canada.

Since the early 1970s, when environmental protection was being increasingly required by the governments of the industrialized countries, there has been recognition that pollution control is costly in terms of money and resources. Perhaps more importantly, many pollution control measures simply move pollutants from one medium to another, often concentrating them. For example, while settling tanks or ponds are valuable treatment technologies used to reduce some pollutants, a sludge builds up on the bottom of the tank. This sludge concentrates other pollutants and this eventually will have to be removed and treated. The result is an additional expenditure of money to treat another waste, in this case, a solid waste, or worse, a hazardous waste. Governments and industries began looking at the sources of the wastes and recognized that controlling them at the source would be a more effective approach.

***Terminology Tip**: As you go through resource materials, you may be confused by the number of terms that get used, often interchangeably, such as pollution prevention, cleaner production, eco-efficiency, source reduction, waste prevention, waste reduction and lean manufacturing. Here's a quick lesson around terminology, although, remember - the terms are not always used consistently by organizations:*

Pollution prevention, cleaner production and eco-efficiency have similar meanings - pollution prevention is the term most often used within Canada. Where these terms are used, they generally include techniques of source reduction, in-process recycling, recovery and reuse (but NOT off-site recycling, composting, treatment or disposal). Eco-efficiency specifically refers to "the delivery of competitively priced goods and services that satisfy human needs and bring about quality of life, while progressively reducing ecological impacts and resource intensity throughout the life cycle to a level at least in line with the earth's estimated carrying capacity."[6]

Source reduction and waste prevention are interchangeable terms and are technically a subset of pollution prevention. Source reduction includes any techniques or procedures that eliminate or reduce the amount of waste being generated (again, off-site recycling, composting, treatment, disposal are not part of source reduction).

Waste reduction is a broader term that encompasses the traditional 3-Rs of reduce, reuse and recycle. Waste reduction includes source reduction, recycling/composting but not treatment or disposal practices.

Lean manufacturing is a management practice that focuses on eliminating all wastes from all business practices.

1.3 Why should my business care about pollution prevention?

The Canadian Council of Ministers of the Environment (CCME) is Canada's forum of 14 environment ministers from the federal, provincial and territorial governments for intergovernmental discussion and action on environmental issues.

The bottom line is that pollution and waste cost your business money. By paying attention to preventing pollution, there are a variety of ways that businesses can benefit, including financially, ensuring regulatory compliance, improved public image and marketing, reduced liability, and ecological advantages. By using a pollution prevention approach in your company, you can reduce or eliminate pollution and inefficiencies.

Here are some reasons why your company should care about pollution prevention:

Reduced operating costs: Most companies generate some waste in all areas of their operation. Operational cost savings may come from decreased raw material purchase costs, and reduced production line costs due to improved efficiencies from simplifying processes or eliminating unnecessary operations. Remember that pollution and waste starts out in your businesses as raw material inputs that you have purchased. Then for every container of waste generated, you pay again for handling, treating and disposing that waste. In other words, you pay for it twice!

Resource conservation: The inefficient use and waste of resources cost companies (and society) money. The manufacturing sector in Ontario alone is estimated to be losing tens of billions of dollars each year simply because of inefficient resource use[7]. Using energy and resources more efficiently can lower energy and water fees.

Generally, Occupational Health and Safety (OHS) programs have focused on the environment inside a facility and how it affects the workers. For example, in an OHS program a safe work procedure would ensure that the worker remains safe when a hazardous product is used (by providing appropriate protection, training in the use/storage of the product, and by understanding the characteristics/properties of the product), and by finding a proper method of disposal. On the other hand, pollution prevention takes a broader, more comprehensive view, and encourages a company to reduce use or find a substitute because of the potential impacts on the environment, solving both problems at once.

Improved worker safety: The costs of an unhealthy and unsafe workplace can be tremendous. Poor environmental practices can result in increased health costs, accidents, sick leave, disabilities, and increased risk to workers and decreased productivity. Pollution prevention is good for business because it can create a safer working environment and increase employee morale and productivity.

Reduced compliance requirements: A business that uses chemicals in its operation generally has greater compliance requirements in terms of permitting, reporting, waste treatment, etc. By integrating pollution prevention into its operation, a business can often reduce these requirements and activities. Businesses lower their environmental risk and limit future corporate and personal liability by implementing pollution prevention and possibly avoid civil and criminal fines. Pollution prevention activities can lead to reduction in risk of releases, upsets or accidents involving toxic chemicals or pollutants.

Improved insurance costs and creditworthiness: Insurance companies and banks know that a business that properly manages its environmental risk will likely manage its business similarly. Good environmental performance and reduced environmental risk may translate to lower insurance premiums, and better creditworthiness.

Increased environmental protection: In general, businesses with good environmental practices contribute to reduced environmental impacts and environmental risks, and better protection of the environment. This can be achieved by minimizing or avoiding the creation of pollutants, reducing flows of liquid effluents to sewers and water ways, reducing greenhouse gas emissions and other air pollutants, reducing demand for landfill space, reducing use of toxic substances, conserving natural resources and reducing wildlife and habitat damage, by extending the life of non-renewable resources, and reducing the volume of waste for disposal.

The push for pollution prevention in small and medium sized enterprises (SMEs) in Nova Scotia

A variety of agencies and organizations have been promoting the "greening" of businesses in the province for many years. Encouraging business to use a pollution prevention approach as opposed to the traditional "command and control" model became a priority for provincial and federal governments in the early 1990's. A number of industry-led and government and industry partnerships resulted in several significant pollution prevention projects aimed at SMEs.

A 1996 Environment Canada commissioned survey characterized the needs of business in the general area of environmental management. Many difficulties in engaging this sector in Nova Scotia were identified. Lack of technical expertise, financial resources and simply time to improve environmental management were common concerns. The lack of a general comprehensive information/training package to assist the small business community was also emphasized. A 1999 study focused on identifying how to assist SMEs integrate pollution prevention into their operations. Recommendations included emphasizing the link with profitability for SMEs, the need for broad partnerships and the indirect involvement of government in assisting the SME sector.

In 1998, the Nova Scotia Department of Environment and Labour developed a Pollution Prevention Implementation Strategy. To promote pollution prevention to businesses, the strategy includes working directly with industry associations and businesses to develop codes of practice, self-assessment guides and other tools. To-date the following guides have been developed and are available:

Enhanced public image: The public has a growing concern for the environment and its quality. Consumers view more favourably businesses that adopt and practice sustainable business strategies. Public image and marketing advantages can be obtained by promoting an environmentally conscious reputation. Pollution prevention is good for a business because it improves relations with a wide range of stakeholders - contractors, suppliers, neighbouring businesses and community, landlords/property managers, head office, general public, regulators, and investors. In a study of small and medium-sized businesses completed by the NS Department of Environment and Labour in 2000, 71% of businesses surveyed cited public image as one of the key drivers for addressing environmental issues.

1.4 I already have a workplace health and safety program - isn't that enough?

Most businesses in Nova Scotia are required by regulation to take precautions to ensure the safety and well being of their workforce. Historically, worker health and safety has been viewed and regulated independently from protection of the environment. This approach is changing across North America, and many companies recognize the natural alignment of pollution prevention and health and safety, and merge environment with health and safety programs, and the benefits of streamlining programs.

The outcome of merging a Health and Safety program with a pollution prevention program can be a more comprehensive-program that allows consideration of both issues and result in safeguarding both the environment and the workers. Another benefit is to reduce person hours spent by combining OHS and pollution prevention meetings. This strategy can be applied to other organizational programs such as Environmental Management Systems and Quality programs like ISO 9000. You should plan to integrate your pollution prevention program into the day-to-day management of the business – try not to develop it in a vacuum.

1.5 I already comply with government regulations. Why should I bother with a pollution prevention program?

Because it makes good business sense. Companies must be in compliance with environmental regulations. But compliance has traditionally meant expensive control techniques and costly disposal of hazardous waste. Implementing a pollution prevention program can improve your company's ability to be in compliance - in fact, you should be able to comply more effectively while reducing costs. By reducing or eliminating an emission, sewage discharge, or hazardous waste generation, you may reduce or eliminate compliance burdens and costs associated with permits, record-keeping and reporting requirements. Eliminating toxic products from a process may eliminate discharge fees and fines. You may not only eliminate treatment and disposal costs for hazardous wastes, but also rid your company of the burdens associated with hazardous products and wastes.

Pollution Prevention Guide for Printers in Atlantic Canada, Green Office Checklist, Environmental Self Assessment Manual for Golf Course Superintendents, Best Management Practices for Hazardous Dental Wastes, and Sustainable Tourism Self Audit Workbook.

In 2000, the Department consulted with a number of small and medium sized businesses in Nova Scotia. The results of the survey showed that a majority of businesses agree that a good environmental image with customers, clients, and their community is very important and working on environmental issues is the right thing to do. 87% said they would prefer to have environmental information provided to them by fact sheets/checklists and detailed self-assessment guides. They also said further information on relevant environment regulations, energy conservation, waste reduction, efficiency improvements and green purchasing would be useful.

All businesses can become more competitive by focusing on efficiency and pollution prevention. Encouraging employees to participate and identify opportunities to become more efficient and prevent pollution can also foster innovative solutions.

Another reason to consider a pollution prevention program? If you use certain chemicals, the federal government has the authority to require that a company prepare and implement a pollution prevention plan (Refer to Module Two for more information).

1.6 Here's what the Workbook includes

The Workbook will provide your business with practical information, ideas, tools, and resources on protecting the environment by focusing on preventing pollution. The four main modules of this Workbook are:

- Pollution Prevention, Water and Wastewater in Your Business
- Eliminating and Reducing Chemicals in Your Business
- Solid Waste Reduction and Resource Recovery in Your Business
- Efficient Energy Use in Your Business

There are also modules on Getting Started with Pollution Prevention and Pollution Prevention and Risk Management. Modules have been designed to follow a consistent format. Modules begin with a Kick-Off Quiz-that could be used as a starting exercise to identify where your company and your staff may be on the topic. There is a section to help you record key information for the company. Since compliance with environmental regulations is the minimum that businesses must do, a summary of the legislation relevant to the module is provided. Also included is a general primer on each topic. There are a number of success stories and case studies throughout each module - as many as possible are Nova Scotian and Canadian, and most are stories of SMEs like you. Modules contain a set of checklists on pollution prevention opportunities and best practices. Initiatives and programs and additional relevant tools and tips are provided throughout the module, as are references and resources.

Module Eight of the Workbook is a directory of contacts for businesses.

1.7 Using the Workbook

The "Pollution Prevention Workbook for Businesses in Nova Scotia" has been organized so it can be used in its entirety, or so that modules can be used independently. Many companies find it difficult to budget the time to address all of the environmental challenges in their business. Businesses can benefit from using individual modules of the Workbook. Businesses may find working on one module per month is a realistic goal for their company. Whatever your approach to using the Workbook, we recommend that you begin with Module Two to give you a good understanding of pollution prevention before you move on to any additional chapters.

1.8 Getting Started - The "Green Business" Quiz

It is suggested that you "kick-off" your use of this Workbook by taking the Green Business Quiz to see how your company stacks up. This Quiz focuses on areas that will be common to many businesses, and is not intended to be a comprehensive set of questions. They are not all pollution prevention questions, but the checklists should encourage you to think about the practices you are currently using, and areas for improvement. Take a "walk-about" of your business with the Quiz in hand. Remember that you may find that you do not always have a "yes" or "no" answer to these questions. That's ok; the idea of the Quiz is to get an overall picture of how your company is operating.

A. Checklist - Good Housekeeping & Operating Practices				
	Yes	**No**	**Don't Know**	**Not Applicable**
Do you have a staff person responsible for environmental management?				
Do you know and comply with relevant municipal, provincial and federal standards and regulations that apply to your business?				
Do you provide regular training for employees to assist them in complying with regulations and improve their awareness?				
Do you keep employees informed and involved in pollution prevention efforts?				
Do you have a pollution prevention-program in place?				
Do you have a preventative maintenance program in place for all equipment?				
Do you control your inventory ("first-in, first-out" policy, minimum inventory)?				
Do you have a solvent management plan in place?				
Do you follow recommended labeling and storage procedures for any chemical products?				
Do you properly reseal solvents, inks, paints, or other solution containers?				
Do you use recommended storage, treatment and disposal procedures for all chemicals, wastewater, and solvents?				
Do you keep your business clean and orderly (e.g., shop, storage areas, production areas, compound)?				
Do you use a laundry service to provide rags for shop and equipment clean up?				
Do you segregate your waste streams?				
Do you keep records of waste sources and disposal?				
Do you periodically review your operational procedures & use appropriate opportunities to improve your environmental performance?				

B. Checklist – Procurement				
	Yes	No	Don't Know	Not Applicable
Do you buy recycled/remanufactured products, wherever possible? (e.g. paper, toner and ink cartridges)?				
Do you buy certified environmentally friendly products/services?				
Do you rent items that are rarely used in your business?				
Do you request that suppliers use recyclable, reusable, and/or returnable packaging, and that they accept your obsolete materials and empty containers?				

C. Checklist - Material Substitution				
	Yes	No	Don't Know	Not Applicable
Do you replace solvent-based cleaners with detergent for general clean-ups?				
Do you replace solvent-based paints with water-based paints?				

D. Checklist - Material Recovery				
	Yes	No	Don't Know	Not Applicable
Do you employ rinsewater recycling in your processes where feasible?				
Do you collect and reuse or recycle chemicals, inks, solvents, and paints?				
Do you reuse and recycle paper?				
Do you recycle used oil, pallets, cans, containers, etc.?				
Do you have an organics/recycling collection program/policy in place in your business?				
Do you look for opportunities to exchange waste materials with other businesses?				

E. Checklist - Energy, Water and Material Conservation				
	Yes	No	Don't Know	Not Applicable
Do you reduce heat to stairwells, hallways and lobbies?				
Do you reduce thermostat settings at night, weekends, and holidays?				
Do you install energy efficient lighting throughout work areas?				
Do you avoid over-lighting areas?				
Do you turn lights off when they are not needed?				
Do you turn off equipment, including computers, when not in use?				
Do you conduct routine maintenance on heating and ventilation equipment?				
Do you repair leaking pipes, hoses, fittings and faucets immediately?				
Do you prevent hoses from running continuously?				
Do you install water saving devices and timers on workplace taps, showers, and toilets?				
Do you use "environmentally friendly" landscaping (avoiding over-watering, watering early in the morning, store water in a rain barrel)?				
Do you encourage employees to conserve water with appropriate signage around the workplace?				

How did your business rate? Don't be discouraged if you couldn't put a "yes" beside many questions. The Workbook will help you to identify opportunities in many of these areas. The basic steps to pollution prevention are often low-cost alternatives to the disposal of waste. Many options do not involve sophisticated technology and are suitable for small and medium-sized business. Some of the methods used are house-keeping and operating practices such as material storage and inventory, maintenance, documentation, employee training, materials substitution, process and technology modifications, material recovery recycling and reuse of materials, procurement, and resource conservation particularly of energy, water and materials.

5.1.1 Atlantic Region Success Story: Furniture Company X - Pollution prevention through efficiency

Furniture Company X has been in business since 1977, but moved into manufacturing in the early 1990's. The company has flourished, with customers throughout Canada and the United States. In 1997, a new 2600 metres^2 facility opened on the outskirts of an Atlantic Canadian community. The company experienced steady growth in sales, and had increased staffing to about 100 employees working in 3 shifts. Limited competition, product diversification and increasing demand had the company thinking about further expansion. Then, a number of problems came to light which required Furniture Company X to re-think how they operate.

When Furniture Company X opened the facility in 1997, the area was zoned commercial and had limited development. There was plenty of land available for expansion. But, the nearby community was growing and housing was beginning to encroach on the site. There were complaints from the plant's neighbours about noise and dust. The municipality wanted to make more land available to homeowners and eventually re-zoned the surrounding land to residential. This meant the plant could not expand, and Furniture Company X was forced to contract some of their production to another woodworking shop to meet demand. The company began experiencing difficulties in simply storing raw materials and inventory.

There were also some problems with the manufacturing process itself, particularly in the sawing operation where a production bottleneck existed. The company was also experiencing a 20% waste in the wood that was brought into the plant, costing them $280,000 per year. In addition, Furniture Company X had to pay tipping and hauling fees of $70,000 per year. As many as 20 bins, primarily of wood waste, were being sent to landfill monthly.

The company also ran into trouble when heavy rainfalls began washing sawdust and wood waste into a nearby stream, interfering with fish habitat.

Furniture Company X rose to the challenges of increasing the plant's capacity, improving efficiency and reducing pollution and waste, within the confines of the physical limitations of their current space. They began with the addition of a production engineer to their management team. The manufacturing process was re-evaluated and eventually reorganized. A change in equipment - installing a new, high-tech saw with scanning capabilities - took care of much of the problem. It allowed them to eliminate the production bottleneck and double their capacity. At the same time, this change eliminated much of the wood waste - reducing it from 20% to 8%. A much more cost-efficient, environmentally responsible solution for the remaining wood waste was also identified. Furniture Company X purchased a wood chipper and found another local company that could use the wood chips as a raw material. This company supplied bins and hauled the wood chips, at no charge to Furniture Company X. Only one bin of garbage now goes to landfill monthly. The problem of stream contamination was solved with improved maintenance and a small settling pond on the property.

The efficiency of Furniture Company X's plant has increased to the point where they've dropped from 3 to 2 shifts per day. This should result in further financial savings related to reduced energy use, while at the same time improving relations with their neighbours by eliminating the noise, traffic and light associated with the overnight shift. An increase in demand has resulted in a change in some jobs as opposed to a loss in jobs, so employment levels have been maintained.

By applying a comprehensive approach to pollution prevention, Furniture Company X was able to solve multiple problems. They are now performing better environmentally and financially, and that simply makes good business sense!

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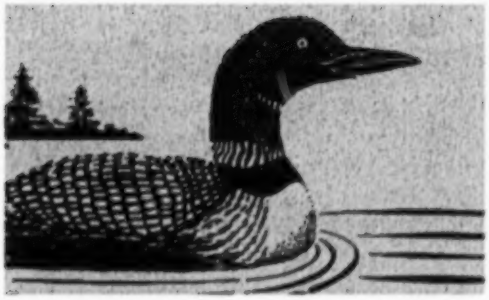
Pollution Prevention Workbook for
Business in Nova Scotia

MODULE 2

Getting Started with Pollution Prevention



Eco-Efficiency Centre
Committed to Excellence and Efficiency

NOVA SCOTIA
Environment and Labour

Introduction

Pollution and waste costs your business money and impacts the environment. By preventing pollution the environment is better protected and typically business liabilities are reduced, while productivity and competitiveness are enhanced.

Pollution Prevention (or P2 as it is sometimes called) is an approach that any size or type of organization can apply to both protect the environment and save money. In its simplest explanation, it is captured by the familiar saying, "an ounce of prevention is worth a pound of cure". If a company doesn't create pollution or waste, it doesn't have to devote time and resources to storing, handling, transporting, treating or disposing of it. Pollution prevention includes conserving water and energy, "green" purchasing, efficient use of raw materials, replacing hazardous products with less hazardous ones, and modifying processes to reduce waste and pollution.

This "Pollution Prevention Workbook for Business in Nova Scotia" has been designed to introduce small and medium-sized businesses to pollution prevention and assist them in making pollution prevention part of their day-to-day decision making - in effect, to help companies realize that pollution prevention efforts simply make "good business sense"!

The "Pollution Prevention Workbook for Business in Nova Scotia" contains seven modules and a directory of contacts. A business can use the entire workbook or can use individual modules one at a time. The series of modules include:

Introduction to Pollution Prevention
Getting Started with Pollution Prevention
Minimizing Risk in your Business: Pollution Prevention & Risk Management
Pollution Prevention, Water and Wastewater in your Business
Eliminating and Reducing Chemicals in your Business
Solid Waste Reduction and Resource Recovery in your Business
Efficient Energy Use in your Business

"Notice to User"

This manual is intended to provide information on the benefits of pollution prevention for businesses in Nova Scotia. It also provides information on some of the relevant laws in effect in Nova Scotia as of the date of publication. It is not intended to provide information on how to comply with all provisions of those laws which may apply to businesses.

This manual is not intended to contain a complete statement of the law in the area of pollution prevention or the environment. This manual does not replace reading the legislation and regulations. Amendments may be made to the legislation or regulations after the publication of this manual and reference should be made to the most recent official version of the legislation and regulations. Anyone needing specific advice on his/her own situation should seek advice from a lawyer or an environmental expert. Examples and interpretations given are not binding on the Crown.

Acknowledgments

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University College of Cape Breton
Nova Scotia Power Inc.
Environment Canada
Eco-Efficiency Centre
Nova Scotia Environment and Labour
Daisy Kidston and Christine Ann Smith, MES students at Dalhousie University
Alberta Department of Environment

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Our appreciation is extended to Environment Canada for their exceptional efforts in having this workbook produced. A special acknowledgement is also extended to the Canadian Centre for Pollution Prevention and to Dr. Robert Pojasek for their wealth of knowledge and their contributions to this document.

We encourage businesses to produce copies of the Workbook as a reference for their pollution prevention efforts and to educate employees. The content of the Workbook is not to be altered without permission from the sponsoring agencies. The Workbook is designed to be updated and amended on a periodic basis. Check the Nova Scotia Environment and Labour website (www.gov.ns.ca/enla) to determine if you have the most recent edition.

February 2003

Getting Started with Pollution Prevention

Module 2

A pollution prevention program needs to fit with a company's overall goals and priorities.

This module includes the following components:

- *Kick-Off Quiz*
- *Pollution Prevention: A Shift in Emphasis*
- *Reminder - The Economic Benefits of Pollution Prevention*
- *Pollution Prevention Planning - The 6 Step Method*
- *Identifying Pollution Prevention Opportunities for Your Business*
- *Relating Pollution Prevention and Other Business and Environmental Activities*
- *Challenges of Pollution Prevention for Business*
- *Final Word: Reviewing the Essential Elements of a Pollution Prevention Program*
- *References and Resources*
- *Success Stories (throughout)*
- *Group Exercise (See Appendix A)*

2.1 Introduction

Module One of the "Pollution Prevention Workbook for Businesses in Nova Scotia" introduced the basics of pollution prevention - an approach that businesses (and individuals) can use to protect the environment and save money at the same time. A business should always start by complying with regulations and by-laws and proceed with reducing risks to the workforce, the neighboring community and the environment. However, in doing so, opportunities to prevent pollution will often cost less and improve the efficiency of material and energy use. It will also reduce, if not prevent, expenditures for treating pollution or disposing of wastes after they have been produced.

What can pollution prevention do for you? Pollution prevention can have many benefits for business, including:

- Reduced operating costs
- Resource conservation
- Improved worker safety
- Enhanced public image
- Reduced compliance requirements
- Improved insurance costs and creditworthiness
- Increased environmental protection
- Pollution prevention also benefits the community in many ways:
- Reducing pollution and health risks, and ensuring a cleaner environment
- Reducing greenhouse gas emissions and air pollution
- Protecting local watercourses and water supplies, and maintaining a healthy environment
- Helping achieve local, regional and national environmental targets
- Reducing costs for communities to build, maintain and upgrade waste management systems

Before you read about specific pollution prevention opportunities that might help you to conserve resources, enhance efficiencies, reduce waste, and save money, it's important to first consider the bigger picture. While you can pick a project and incorporate it successfully into your operation, your company will gain the most value from any environmental program if a comprehensive program and longer-term commitment are undertaken. A pollution prevention program needs to fit with a company's overall goals and priorities. A pollution prevention program needs to complement other programs, such as Workplace Health and Safety, an environmental management system, or a quality management program, such as ISO 9000. It also needs to have the support and commitment of the entire organization from the top down.

This module, "Getting Started with Pollution Prevention" will provide your business with a good background on pollution prevention and a framework for developing a pollution prevention plan before you move on to additional modules.

2.2 Kick-Off Quiz

Before starting this module, take our Kick-Off Quiz to see how your company currently rates on pollution prevention. Scoring works as follows: no = 0 points, somewhat = 1 point yes = 2 points. Write your score in the blank provided at the end of each question.

1. Are you aware of, and in compliance with all federal, provincial and municipal environmental legislation, regulations and by-laws that apply to your operation? *(Compliance with applicable regulations is the starting point for every company, but a pollution prevention program can help you comply more effectively while reducing costs.)* ________

2. Can you identify the discharges of your company to air, water and land? *(If you don't know what your company is emitting, you may be in violation of municipal, provincial or federal legislation. You also can't be prepared if an accident, fire or spill occurs.)* ________

3. Are any of the chemicals used by your company listed on toxic or priority substance lists of the Canadian Environmental Protection Act (CEPA)? *(Some of the products you use may be targeted for increased regulatory focus or for elimination. It may be difficult and/or more costly to use these products in the future.)* ________

4. Have you done a thorough analysis of all possibilities for reducing water consumption? *(Water represents a common expense for business - wasted water comes straight off the bottom line.)* ________

5. Are you aware of all possibilities for conserving energy in your company? *(For most businesses, energy represents a significant expense. They are many low cost/no cost methods to lower your energy costs.)* ________

Total Score: ________

If you are not confident of the answers to any of the above questions, this Workbook is designed for you.

If you scored between 8-10, keep up the good work. Use the Workbook to help you zero in on the environmental issues that still need to be addressed.

Between 4 -7, you are not doing too badly but could likely improve and reduce your company's environmental impacts in many areas. Read through the Workbook to identify broad areas of priority. Below 4, you need help, but there's lots of assistance available. You'll benefit from working through the entire Workbook, on a module by module basis. Read on!

Nova Scotia Success Story - Scanwood Canada Ltd., Dartmouth, NS

Scanwood Canada Ltd., a subsidiary of IKEA, manufactures board furniture for distribution and sale throughout the North American market. They employ over 150 employees in their Dartmouth, Nova Scotia plant. IKEA, internationally recognized as a leader in environmental management, has adopted the principles of the *Natural Step Program*, a systems-based approach for implementing sustainable business practices. Scanwood has embraced the same program in an effort to further improve its environmental performance on their way to becoming ISO 14001 registered and certified.

Scanwood's commitment to better managing their in-house wastes and the results they have achieved are impressive. In 2000, they diverted 16.24 metric tons of materials from landfill. The amount of materials going to landfill dropped by 22% between 1999 and 2000. Power and oil consumption has decreased and water consumption is down. The amount of glue wastewater and sludge going into their effluent stream dropped from 22,964 litres in 1998 to 3,921 in 1999, and was completely eliminated in 2000. The company replaced its painting equipment with new UV-based technology. This new system reduces Volatile Organic Compounds (VOC) emissions and uses less energy-intensive UV light to cure the paint. Further, the quality of the finished product has improved; dropping the rejection rate to less than 1%, i.e., the total number of products that do not meet the quality specifications is less than 1% of the entire production. In 1998, Scanwood used three substances of concern that required reporting through the National Pollutant Release Inventory program. By 2000, they had eliminated the use of Methyl Ethyl Ketone, their most prevalent toxic, and drastically reduced emissions of the other two substances.

What's the secret to Scanwood's success? It began at the top with a committed and conscientious president. Linking quality, environment and safety was also important. The company encouraged the formation of an environmental group made up of six employees. They have assumed responsibility for developing and maintaining Swedwood's environmental programs. But, with a manufacturing company the size of Scanwood, and a large number and variety of wastes to track, eco-efficiency seemed a daunting goal. In 1999, the environment group developed a spreadsheet to serve as a watchdog to continually improve their environmental management system. This comprehensive database is a model to be proud of. Their complete inventory - in coming, in-house manufacturing materials and outgoing products - is tracked. All waste products are segregated and weighed, and all employees take part in the process.

In addition to management support and an effective tracking system, the other key to Scanwood's success, has been training. All staff is trained on Scanwood's environmental practices, procedures and their environmental management system. The company uses a very focused three-pronged training approach aimed at producing a quality product, providing safe working conditions, and protecting the environment through effective resource management. Staff is also encouraged to identify problem areas and make suggestions on ways to improve the workplace.

What about the economics? Scanwood has had significant up-front costs associated with some of the technology/equipment changes. However, they are seeing payback in many areas. Some of the solid waste previously sent to landfill is now used for heat recovery, so their heating costs have dropped drastically. A lighting retrofit is lowering their power bill. Money is being saved on raw materials as less product is wasted, and less hazardous material is handled. Scanwood's reduction in solid waste is resulting in reduced hauling fees, and they are able to generate some revenue through the sale of some of their by-products.

As Scanwood continues to implement new and innovative strategies aimed at eco-efficiency how far can they be from creating a balance between inventory and finished product, with just a trickle of waste?

For further information contact:

Scanwood Canada Ltd
180 Thornhill Dr.,
Dartmouth, NS
B3B 1B3

2.3 Pollution Prevention: A Shift in Emphasis

Evolution of Environmental Protection: The Move from Control to Prevention

In the late 1960's and 70's, North American governments developed regulations based largely on the visibility of environmental problems and the legislation available to address them. Regulations were rooted in the command and control protection model, enforced by government inspectors who could impose appropriate penalties.

Command and control is extremely costly, bureaucratic and a highly confrontational approach to environmental protection.

The command and control model places the emphasis of environmental protection at the "end-of-the-pipe" that enters the environment - the top of a smokestack or the point where wastewater discharges into rivers or coastal waters.

However, control and specifically "end-of-pipe" technological solutions have limited usefulness and best available technology is often costly. In addition, our knowledge regarding the nature of environmental problems has changed. One of the big challenges is persistent toxic substances (these are toxic chemicals that take a long time to break down, if ever, into harmless substances in the environment) and increasing pollution from the use of products, not industrial processes alone.

It became evident that a new approach needed to be developed, to complement the command and control strategy. Pollution prevention was one alternative adopted by Canadian provincial and federal governments.

Pollution prevention involves a shift in focus from controlling the problem after the fact to minimizing or avoiding it in the first place; from clean-up to a more cost-effective preventative approach. Figure 1 illustrates this shift in focus.

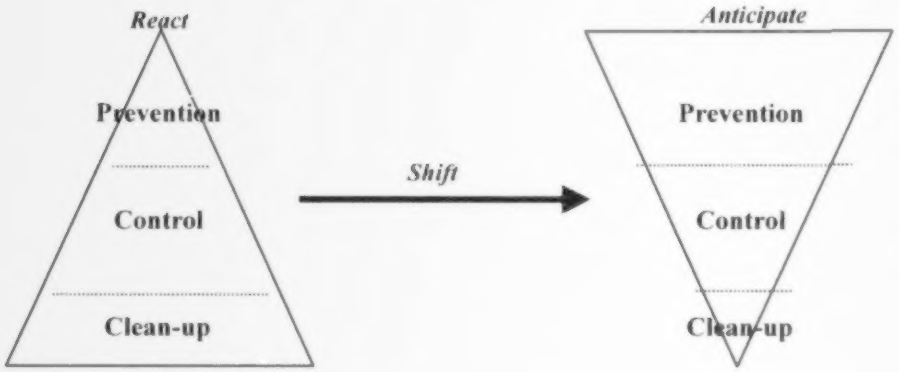

Figure 1 The Environmental Protection Hierarchy

Environmental protection activities can be seen as a hierarchy of practices. Approaches that anticipate and prevent the creation of pollutants and wastes are preferred to other methods, such as treatment, re-use and recycling. The latter methods are still important in our overall environmental protection efforts, but even the best pollution control practices can never be as effective as avoiding the creation of waste in the first place.

At 3M, pollution prevention has encouraged 4650 employee projects, eliminated 1.6 billion pounds of pollutants, and saved $810 million dollars.[1]

Kiuchi and Shireman, 2002

The approach with pollution prevention is, first of all, to focus on **source reduction** - it is more efficient to eliminate the creation of pollutants ***at the source*** than trying to treat them at the end-of-pipe. Thus input substitution, good housekeeping, process change, resource conservation and cleaner technologies are coming to the forefront.

Various levels of government in consultation with stakeholders in the private sector, environmental non-government organizations, communities, labour and academia are putting pollution prevention into practice through a mix of regulatory and non-regulatory instruments. This includes updating the Canadian Environmental Protection Act (CEPA 1999) to more formally entrench pollution prevention into the federal environmental regulations and policy, and including the concept of pollution prevention as the foundation for long-term environmental protection in the Nova Scotia Environment Act (1995).

Coors Brewing Company believes "all pollution and all waste is lost profit". In that sense, waste is something a company pays for twice - when it purchases the materials and energy inputs, and when it pays for disposal and treatment.[2]

Kiuchi and Shireman, 2002

2.4 Reminder - The Economic Benefits of Pollution Prevention

When you implement pollution prevention in your facility, you save on both direct and indirect costs. Throughout this Workbook, you will find examples of companies, many of them Nova Scotian, that have implemented pollution prevention activities and improved their environmental performance while saving money. There are many potential areas for savings, and some examples follow.

Examples of savings on direct and indirect operating costs resulting from pollution prevention [3]	
Direct Operating Costs • Reduced operating costs related to the handling, treatment, storage, or disposal of wastes • Reduced materials costs, such as for production and packaging procedures • Reduced waste management and disposal costs • Reduction in production costs such as increased efficiency, improved maintenance and material handling • Reduced energy cost • Reduction in permitting and monitoring costs	**Indirect Operating Costs** • Employees will likely feel more positive about their work environment. This may result in increased employee morale, increased productivity, reduced sick time, less employee turnover • Reduced workers' compensation costs and risks related to accidents, involving toxic chemicals • Financing and insurance costs could be reduced once a company demonstrates their sound approach to business, such as by reducing risks associated with use of toxins

Of course, apart from the financial reasons, there may be other reasons to improve your environmental performance. The following table, developed by the Society of Management Accountants of Canada, provides a number of other reasons to adopt pollution prevention.

Why are Companies adopting Pollution Prevention, Eco-efficiency and working towards Sustainable Development? [4]

Issue and Stakeholder	Explanation
1. Better Relations with Residents of Local Communities	The cost of poor public relations with residents of local communities can be substantial if it results in resistance to new project start-ups, facility expansions or ongoing developments.
2. Increase Ecological and Economic Efficiency of Operations: Stakeholder Shareholders, Customers, Environment	The term eco-efficiency is a contraction of ecological and economic efficiency. It advocates doing more with less. Companies benefit from eco-efficiency by reducing the energy and material requirements of production.
3. Promote Industry-Wide Self-Regulation/Affect Legislation	When industry and government combine expertise, practical and cost-effective self-regulatory programs and/or legislation will often emerge. It serves the public's best interest when industry and government develop programs cooperatively.

4. Enhance Due Diligence Protection	During 1990-1995 a record number of Canadian corporate executives were convicted of environmental offenses (2.5 executives/year). Total annual environmental fines in excess of $1 million are not uncommon in the resource sector.
5. Address Value Chain of Customers, Suppliers, etc.	Customers are increasingly concerned vis-à-vis the harm that corporate practices might convey to the environment. ISO2 and the International Chamber of Commerce have developed objective criteria to assess environmental product claims.
6. Address Media and Activist Pressures	Organizations like Greenpeace, Friends of the Earth, Nature Conservancy of Canada and the Sierra Club can affect public perceptions of business, thus affecting start-up of operations.
7. Corporate Commitment to Stewardship Practices through Employees Involvement	Any corporate sustainable development program must have the support of all employees, from the boardroom to the shop floor. Employees who are committed to a corporate cause will work more diligently to realize a vision.
8. Lower Insurance Premiums	Although few Canadian companies currently carry environmental insurance (i.e., many major companies are self-insured), insurance companies are including sustainable development initiatives in the underwriting process.
9. Lower Bank Loan Rates	Most major banks employ senior environmental managers to assess the cumulative environmental risk associated with the lending of money for mortgage holdings, land acquisitions, etc. Interest rates are adjusted to reflect risk.
10. Facilitate Inclusion in Ethical Mutual Fund/Investment Portfolios	An increasing number of mutual funds and investment portfolios use "ethical" screens. Corporate sustainable development can facilitate a company's inclusion in ethical portfolios, thus affecting a positive and ethical impact on share price.

2.5 Pollution Prevention Planning - The 6 Step Method

Pollution prevention, and the benefits arising from it, does not just happen. Pollution prevention requires planning and implementation to determine where to go, how to get there, and how to select the best pollution prevention options.

A *Pollution Prevention Plan* is a written guide used to formalize pollution prevention activities and chart the progress of a facility's pollution prevention program. It is simply a systematic business plan with a focus on pollution prevention activities. In developing a pollution prevention plan, an organization:

- Improves its knowledge about its business operations
- Collects relevant environmental and financial information
- Identifies significant material and energy losses
- Establishes targets for reducing losses
- Evaluates pollution prevention opportunities to address losses
- Establishes procedures to implement selected opportunities
- Identifies resources and accountable parties
- Establishes criteria for measuring success and a monitoring program to track progress
- Evaluates effectiveness and then makes changes when necessary

The concept of pollution prevention planning has evolved rapidly and sounds intimidating. Despite the growth and evolution of pollution prevention there is no standardized format or content of a pollution prevention plan. No two pollution prevention plans will be the same - the size of your company and the diversity of your product lines are two factors that influence the size and structure of your plan. As well, while your business may be required to prepare and implement a pollution prevention plan under the Canadian Environmental Protection Act (CEPA 1999), the federal government does not prescribe the form of pollution prevention plans.

However, for guidance purposes, a model pollution prevention plan has been developed and is described in the Pollution Prevention Planning Handbook which outlines the following six steps. References for these materials are noted at the end of this module.

Step 1. Commitment and Policy
Corporate commitment to pollution prevention is key, but commitment to the development of a plan works best if all employees, from senior management to those who operate the equipment, are involved and informed. A written policy is also crucial, as it will serve as a formal guideline for pollution prevention initiatives. At this step, a planning team or green team representing all interests and resources from the business is assembled.

No two pollution prevention plans will be the same - the size of your company and the diversity of your product lines are two factors that influence the size and structure of your plan.

Summary: Six Steps for Developing a Pollution Prevention Plan

Step 1. Commitment and Policy
Obtaining senior management commitment, developing a written policy, and organizing a planning team.

Step 2. Baseline Review
Assessing the current situation by collecting information on production processes, material inputs, and waste by-products.

Step 3. Planning
Developing a plan detailing objectives, targets, and options for pollution prevention. Ensure it is measurable.

Step 4. Implementation
Implementing the plan, with attention to employee training and support mechanisms.

Step 5. Monitoring and Reporting
Studying and documenting the status and progress of the plan.

Step 6. Review, Evaluation and Improvement
Ongoing evaluation of the plan, including reports and corrective action.

Appendix F of this Workbook provides further information on the importance of these committees. Some general planning actions such as schedules and terms of reference should all be identified at this stage.

Step 2. Baseline Review

In step 2, the team must undertake a review of the company's past and present performance - their wastes and sources of pollution. This involves collecting detailed information on processes. To assist in identifying and recording some of the basic data, a section on "Gathering Key Pieces of Information", has been included in the modules that follow. At least some of the information will be available but may be in different areas of the organization: shipping and receiving, accounts, facilities management. There are many tools that can be used to collect baseline data such as mass-balance models and total costs/benefit assessment - identifying costs and benefits associated with current operations is crucial.

Each pollution prevention opportunity will have different costs and different benefits associated with it. Some options will be identified that can be implemented quickly and with little cost or risk.

Step 3. Planning

Based on baseline data, the team next moves into development of a pollution prevention plan. This step includes defining the scope of the pollution prevention plan, along with realistic objectives and target setting. This requires identifying and evaluating possible pollution prevention options. In this Workbook, examples of pollution prevention options are outlined in the four main modules as part of the checklists section. These modules also have forms to record options that you've identified that require additional consideration for your particular business. There is also a group exercise (Appendix A) that can help you assess techniques for reducing workplace environmental pollutants. There are a variety of tools that are used in assessing, screening and ranking these options that include technical, environmental, economic, social and corporate guidelines. Refer to Appendix B for a Feasibility Checklist to help you undertake a more thorough assessment of possible pollution prevention opportunities. Environmental accounting is a tool that can help companies to identify direct and indirect environmental costs. See Appendix G for more information on Environmental accounting.

Once the preferred pollution prevention options are identified, the team identifies the employees responsible for undertaking the options and completion dates.

Step 4. Implementation

Key to implementing a successful pollution prevention program is employee support and participation. The time to engage staff is as the plan is being implemented. Employee training, effective communication, and support mechanisms to assist in motivating employees are components of this step. You can find a section on educating and raising pollution prevention awareness of staff in Appendix F of this Workbook along with suggestions in a number of the checklists.

Step 5. Monitoring and Reporting
Once the plan is underway, it is important to track the progress and document the results. Monitoring progress against the objectives and targets set in Step 3 may be part of the tracking process. However, progress can be measured in many ways - looking at money saved or amount of waste reduced for example. The tracking may reveal that a corrective action is required. Information on progress needs to be shared as the plan is implemented. This information may be distributed in a variety of ways - for example, company newsletters, public reports, or at staff meetings.

Step 6. Review, Evaluation and Improvement
The performance of the pollution prevention plan needs to be reviewed on an ongoing basis. This step includes regular evaluation of the plan, including refining objectives, targets, timelines and resources, and promoting continuous improvement of the pollution prevention program in the company.

2.6 Identifying Pollution Prevention Opportunities for your Business

As noted in the previous section, Step 3 of pollution prevention planning requires identifying and evaluating pollution prevention options. Pollution prevention practices and techniques will vary from situation to situation, but generally, they fall into the areas outlined below.

Product design and reformulation: This is the redesign or reformulation of a product so that pollutants and waste are reduced or eliminated (e.g., the reformulation of CFC-based aerosol products to ones using water-based propellants).

Materials and feedstock substitution (source substitution): This means using materials and feedstock that are less polluting or non-polluting (e.g., the use of cleaner burning ethanol fuel from biomass, to replace or supplement conventional hydrocarbon fuel).

Equipment modifications and process changes: This includes making changes in production processes or equipment modifications that can eliminate or reduce the use of certain substances, or can offer efficiencies (e.g., changing an industrial paint line from solvent-based spray to water-based or baked-on powder finish).

Inventory management and purchasing: Significant waste reduction, risk reduction and cost savings can be achieved by incorporating environmental considerations into purchasing and inventory management practices (e.g., purchase of chemicals in bulk returnable, reusable containers, rather than in small throwaway containers) or making suppliers responsible for keeping products from stale-dating.

Prior to considering pollution prevention options, remember that requirements legislated by municipal, provincial, and federal authorities must be considered an absolute priority and should NOT be assessed for feasibility with the other options.

Operating efficiencies and training: Improvements in work procedures and employee training often yield substantial benefits (e.g., improved handling of solvents, such as removing parts from a solvent sink slowly, reduces spillage, saves on solvent, and reduces costs).

On-site reuse and recycling: If wastes can be reused or recycled on-site, in production ("by-product recovery"), there can be significant benefits. (e.g., trim and cuttings from papermaking or plastics molding reused in on-site production, rather than being sent off-site for waste disposal).

As you review your business you will want to generate a comprehensive set of pollution prevention opportunities, and categorize them. In addition to using the checklists in each of the Workbook modules, planning teams are encouraged to identify pollution prevention options specific to their operation. Appendix F outlines several tools or methods that can be used to identify and prioritize ideas. Each pollution prevention opportunity will have different costs and different benefits associated with it. Some options will be identified that can be implemented quickly and with little cost or risk. Some options will be found to have marginal value or to be impractical. Many options, however, will be more complex and will require in-depth assessment.

Collecting accurate and detailed information concerning the costs and savings related to pollution prevention techniques is critical to ensuring that the financial benefits are properly assessed. As mentioned previously, there are a variety of strategies and tools that are used by business to evaluate and prioritize practices and technologies. It is recommended you consult the Pollution Prevention Planning Handbook, as well as other manuals listed in the resource section of this Workbook, for more information.

By integrating pollution prevention planning into other business programs, or consolidating programs, a business reduces duplication and often identifies more available resources to get a pollution prevention program launched.

One common method is to use feasibility assessments to identify whether opportunities are technically, financially and environmentally viable for your organization. Appendix B of the Workbook is a Feasibility Checklist that will provide you with one way to begin to prioritize your options.

2.7 Relating Pollution Prevention and Other Business and Environmental Activities

In Module One, the advantages of merging a workplace health and safety program with a pollution prevention program were addressed. You may have other compatible programs that need to be taken into account in undertaking pollution prevention - a quality management program, preventive maintenance program, a risk management program or perhaps an existing environmental management program. The basic principles behind these preventive programs are the same as the principles behind pollution prevention programs. By integrating pollution prevention planning into other business programs, or consolidating programs, a business reduces duplication and often identifies more available resources to get a pollution prevention program launched. Combining your quality, environmental or health and safety management systems into one integrated system can help your organization save time, money and improve the overall effectiveness of the system. You'll find that there are a number of common elements of these programs.

Environmental Management Systems require companies to formalize environmental policies, environmental impact identification, objectives, consultation, operational and emergency procedures, documentation, reporting, training, and continual improvement.

Environmental Management Systems
Many Nova Scotia companies may be familiar with quality management programs that establish a company's policies and objectives related to quality, and provide a structure for documenting and implementing the procedures needed to attain these goals. In fact, some of your customers may expect (or require) you to have a management system in place. The most common example of a quality management system is ISO 9000 - a series of international standards dealing with quality management. It is less likely that your company has had experience with an Environmental Management System (EMS). Like a quality management program, it is simply a structured approach to planning, managing, and documenting environment protection measures both current and future. An EMS normally requires companies to include pollution prevention in their environmental policy. EMSs also require companies to formalize environmental policies, environmental impact identification, objectives, consultation, operational and emergency procedures, documentation, reporting, training, and continual improvement. An EMS should ensure that an organization is aware of the environmental impact of its activities, and is taking steps to manage that impact. Putting a formal EMS in place and maintaining the system requires a significant investment of time and resources but depending on your products and markets it may be worthwhile.

There are a number of formal Environmental Management Systems that have been developed, with the ISO 14000 set of international standards being the most widely known (although in Nova Scotia only a handful of companies have actually registered their companies as ISO 14000). Like ISO 9000, ISO 14000 provides a formal set of practices and tools. In fact, the basic structure of the two series is similar. Like the merging of environment and health and safety programs, companies are also starting to realize the benefits of integrated management systems for both quality and the environment.

If you have implemented an EMS and would like to integrate pollution prevention planning, review the elements of your company's EMS and determine how pollution prevention principles and practices can be incorporated into each area. For example, ensure there is a commitment to pollution prevention included in the company's environmental policy - the first element of an EMS.

The Pollution Prevention Planning Handbook lays out the various elements of an ISO 14000 EMS and provides guidance for each step on incorporating pollution prevention. Refer to it for assistance.

Risk Management Systems

Some companies may already have implemented a risk management program. Integrating pollution prevention and risk management activities can reduce environmental and health risks resulting from your company's operations. Module 3, "Minimizing Risk in Your Business: Pollution Prevention and Risk Management" will assist you in integrating these two programs.

The main barriers to implementing pollution prevention are often categorized as economic, regulatory and operational barriers.

2.8 Challenges of Pollution Prevention for Business

Although there are clearly benefits to pollution prevention, implementation can be challenging. Some of the challenges listed below are potential problems that inhibit the adoption of successful pollution prevention programs. Typically there are three categories of barriers: economic, regulatory and operational/administrative barriers.

Recognize and address challenges early, so they do not become major impediments to the adoption of a pollution prevention plan later.

Economic

- *Capital requirements.* While many pollution prevention efforts are low/no cost, some pollution prevention measures may require capital investment. Therefore, a business case may need to be made to acquire funding.

Regulatory

- *Regulatory issue.* It may be necessary to obtain a new Certificate of Approval or other governmental approval before implementing a process or operating change.

Operational/administrative

- *Lack of management support.* Without full and visible management support, a pollution prevention program may have limited success.

- *Specifications.* The procedure may specify that certain materials be used in the manufacture of a product or that a virgin material be used. Such limitations should be considered where possible.
- *Customer acceptance.* Anything that affects quality or the perception of quality may affect acceptance by the customer. Even product improvements constitute change and may meet with some opposition.
- *Lack of appropriate incentives.* Some companies, particularly small and medium businesses, will only act if they are forced to act by regulatory requirements or customer demand.
- *Immediate production concerns.* There may be a reduction in production during the changeover to pollution prevention.
- *Operating costs.* Implementation of pollution prevention projects may require time, money and personnel, all of which are in short supply.
- *Inertia.* Often organizations are hesitant to admit that the old way may have not been the best way.
- *The "Green Wall."* Many pollution prevention programs have stalled, experiencing the phenomena of hitting the green wall. This is because organizations are skeptical about the potential benefits of pollution prevention and hesitate to invest in source reduction.

The essential elements of a pollution prevention program? Management commitment, employee involvement, and cost awareness.

When implementing pollution prevention in your business, it is important to recognize and address challenges at an early stage so they do not become major impediments to the adoption of a pollution prevention plan later. With proper planning, including consultation with regulatory agencies, financial institutions, suppliers and customers, many of these challenges can be overcome.

2.9 Final Word: Reviewing the Essential Elements of a Pollution Prevention Program

Experience from a growing number of companies shows that the following elements are important for the successful start of a pollution prevention program:

- *Management commitment:* Senior management has to "walk the talk" - set the stage, in order to ensure collaboration and participation. Management commitment may be reflected in environmental policy statements, however, the actual behaviour of the management is at least as important as written statements.

- *Employee involvement:* Management should set the stage, but whether or not good pollution prevention opportunities are found is largely dependent on the collaboration of employees. Employees, in particular those involved in the daily operations and maintenance on the shop-floor, have often key understanding of why wastes and emissions are generated, and are often able to come up with solutions.

- *Cost awareness:* This is important in the sense that proper cost information can convince management, as well as employees, that producing cleaner can make money. Unfortunately, many companies (not just small and medium sized enterprises) do not know how much money is spent on various operations and how much may be wasted. As an example, typically, only costs charged by external waste contractors are considered in an examination of solid waste collection. Actual waste costs can be significantly more.

Canadian Success Story: Traces Screen-Printing, Waterloo, Ontario

Traces Screen-Printing is a small, locally owned textile screen-printing company located in Waterloo, Ontario. Since its inception in 1985, Traces has been a trailblazer in the print industry for its environmental efforts, integrating environmental quality into its corporate culture. It uses only non-carcinogenic and drain-safe chemicals in its processes, minimizes use of water, electricity and heating and has implemented waste reduction strategies. It presently employs nine staff. Below is an outline of Traces' successes:

Green Purchasing

- All of the manufacturers and suppliers that Traces works with carry products that have environmental benefits and are derived from organic materials.
- Constant watch for new products that are not harmful to the environment allows Traces to remain on the forefront of environmental responsibility.
- Orders to distributors are placed in bulk, combining as many orders as possible. Traces requests that all shipping be packed in bulk, reducing the amount of cardboard used. Traces also reuses the boxes in packing orders to customers.

Process Changes

- Environmental reassessment of all processes each year ensures Traces operates production in the most environmentally mindful way.
- The business instituted a new ink mixing system in August 2000 which allows exact amounts of ink to be mixed per job specification, thereby reducing the amount of ink used, as well as excess waste.
- Over the course of two years, Traces researched and developed temporary tattoos using a specially formulated adhesive that is safer than bandage glue. The glue is completely organic, and breaks down safely and easily in water.
- Newspapers are reused for screen cleaning, old garments for cleaning, ruined garments are used for test prints and unsolicited faxes are cut up and used for scratchpads.

Improved Staff Consciousness

- Employees bring in newspapers, unlabeled containers, clothing and other goods to be re-used in production before going to landfill.

- All computers are turned off nightly, all heat is turned down when people are out of the building and everything is powered down when not in use.

Outreach Activities

- Traces publishes quarterly newspapers which often include handouts or articles promoting environmental awareness.
- Tracey Johnston-Aldworth, CEO of Traces Screen-Printing Ltd., offers free public speaking to community groups, schools and companies on simple ways to make lasting and economical environmental change.

Results and Recognition

- Traces accounts five per cent of the firm's profits to waste-reduction efforts.
- Other groups seek out Traces when wishing to do print orders, based on Traces' excellent environmental record.
- In 1994, Traces won the Kitchener-Waterloo Chamber of Commerce Environmental Achievement Award. The following year Traces was the recipient of The Regional Municipality of Waterloo's Environmental Award.
- In 1995, Traces participated in a 15 minute movie; produced by the Association of Municipal Recycling Coordinators "Stop Waste from Adding Up" This film shows how environmental efforts in business can help the environment and increase your "bottom line".
- In 2001, Traces Screen-Printing Ltd. was given an Environmental Sustainability Award for business in the Region of Waterloo.

For more information on Traces' environmental efforts, visit their website at www.traces.com

2.10 References and Resources

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[3] Adapted from: The Government of Ontario. 1993. Pollution Prevention Planning Guidance Document and Workbook.

[4] Society of Management Accountants of Canada. http://www.cma-canada.org/

Resources

Guides/Checklists/Fact Sheets/Publications

Environment Canada Publications

Consult the following Environment Canada fact sheets and publications for information of pollution prevention planning:

- Pollution Prevention Planning Handbook (CEPA 2001). A comprehensive guidebook providing information for developing a pollution prevention plan based on CEPA guidelines.

- Guidelines for the Implementation of the Pollution Prevention Planning Provisions of Part 4 of the CEPA 1999 (National Office of Pollution Prevention--Environment Canada, Feb. 2001). A handbook providing information on who will be required by CEPA to create a pollution prevention plan and how. Examples of the progress reports, notifications, and declarations related to the pollution prevention plan are provided.

- Pollution Prevention Planning Provisions of Part 4 of the Canadian Environmental Protection Act, 1999 - Frequently Asked Questions (FAQ) (Environment Canada). An easy to read, accessible publication providing FAQ's related to pollution prevention planning.

- Fact Sheets: Pollution Prevention Planning - The Basics and The Nuts and Bolts of Pollution Prevention Planning

To download these documents, go to Environment Canada's National Office of Pollution Prevention at http://www.ec.gc.ca/nopp/cepa-lcpe/index.cfm.

Other Environment Canada Publications and Websites

- Atlantic Region, Environmental Management & Technology Section – Pollution Prevention.
  http://www.ns.ec.gc.ca/epb/pollprev/index.html

- CEPA Environmental Registry.
  http://www.ec.gc.ca/ceparegistry/default.cfm

- Environmental Life Cycle Management: A Guide for Better Business Decisions. 1997.

- Introductory Guide to Environmental Accounting. 1997.

- Progress in Pollution Prevention - Annual Reports.
  http://www.ec.gc.ca/p2progress

- Pollution Prevention Fact Sheets (22).
  http://www.on.ec.gc.ca/epb/fpd/fsheets/intro-e.html

- Environmental Management at Federal Facilities: Pollution Prevention Self-Assessment Guide. 1996.

- National Office of Pollution Prevention.
  http://www.ec.gc.ca/nopp/

Other Publications

American Council for an Energy Efficiency Economy. 1998. Making Business Sense of Energy Efficiency and Pollution Prevention.

Canadian Institute for Environmental Law and Policy. 1998. The Citizen's Guide to Pollution Prevention.

EnviroSense: Small Business Waste Reduction Guide. Working Glossary of Solid and Hazardous Waste Terminology. http://es.epa.gov/new/business/sbdc/sbdc137.htm

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Hampshire Businesses. http://www.state.nh.us/des/nhppp

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Purchasing Management Association of Canada. 1997. Going Green: Using Environmental Purchasing Practices to Improve Your Bottom Line. http://www.pmac.ca

Region of Peel, Ontario – Public Works. Waste Reduction in your Workplace Fact Sheets. http://www.region.peel.on.ca/pw/waste/business/factshet.htm

Sonoma County – Green Business Program. 2001. Resource Conservation and Pollution Prevention Checklist for the Graphic Arts/Printing Industries. http://www.sonoma-county.org/eservice/green.htm

South Dakota. Pollution Prevention Assessment Manual. http://www.state.sd.us/denr/DFTA/WatershedProtection/P2/Documents/P2Assessment%20Manual.pdf

Sustainable Business Associates. 1998. Good Housekeeping Guide for Small & Medium-Sized Enterprises. http://www.getf.org/file/toolmanager/O16F15343.pdf

US - EPA, Office of Research and Development. An Organizational Guide to Pollution Prevention. 2001.

US - EPA, Office of Research and Development. Guide to Industrial Assessments for Pollution Prevention and Energy Efficiency. 2001.

United Nations Environment Programme's Division of Technology, Industry and Environment (UNEP DTIE) and the Wuppertal Institute for Climate, Environment and Energy. Efficient Entrepreneur: A Calendar for Small and Medium-Sized Enterprises. http://www.efficient-entrepreneur.net/index2.html

Websites

A free searchable on-line database of ISO 14,000 registered companies can be found at
http://www.worldpreferred.com/default.asp

Arizona Department of Environmental Quality – Environmental Programs.
http://www.adeq.state.az.us/environ/waste/hazwaste/p2/index.html

Bridging the Gap. http://www.bridgingthegap.org/atworkMain.htm

Canadian Centre for Pollution Prevention.
http://www.c2p2online.com

Canadian Environmental Solutions.
http://strategis.ic.gc.ca/Ces_Web/_index_.cfm?target=english

Canadian Pollution Prevention Information Clearinghouse.
http://www.ec.gc.ca/cppic/

Florida Department of Environmental Protection – Pollution Prevention Program.
http://www.dep.state.fl.us/waste/categories/p2/default.htm

GreenBiz.com (The Resource Centre on Business, the Environment and the Bottom Line). http://www.greenbiz.com

Illinois Waste Management and Research Centre.
http://www.wmrc.uiuc.edu/

Industry Canada – Eco-Efficiency Webpage and Self Assessment Tools. http://strategis.ic.gc.ca/SSG/ef00025e.html

Minnesota Office of Environmental Assistance.
http://www.moea.state.mn.us/

New York State Department of Environmental Conservation-Pollution Prevention Unit.
http://www.dec.state.ny.us/website/ppu/p2pub.html

North Caroline Division of Pollution Prevention and Environmental Assistance. http://www.p2pays.org/

Nova Scotia Department of Environment and Labour – Pollution Prevention Division. http://www.gov.ns.ca/enla/

Pacific Northwest Pollution Prevention Resource Center.
http://www.pprc.org

Pennsylvania Department of Environmental Protection- Office of Pollution Prevention and Compliance Assistance. http://www.dep.state.pa.us/dep/deputate/pollprev/pollution_prevention.html

Pollution Prevention Resource Exchange (P2Rx). http://www.p2rx.org/

Standards Council of Canada. http://www.scc.ca/home_e.html

US – EPA, Office of Pollution Prevention and Toxics. Pollution Prevention Homepage. http://www.epa.gov/p2/

US – EPA Waste Reduction Resource Center. http://wrrc.p2pays.org/

US Department of Energy Pollution Prevention Information Clearinghouse (PPIC). http://epic.er.doe.gov/epic/

Pollution Prevention Workbook for
Business in Nova Scotia

MODULE 3

Minimizing Risk in Your Business: Pollution Prevention & Risk Management

Eco-Efficiency
Centre
*Committed to Excellence
and Efficiency*

NOVA SCOTIA
Environment and Labour

Introduction

Pollution and waste costs your business money and impacts the environment. By preventing pollution the environment is better protected and typically business liabilities are reduced, while productivity and competitiveness are enhanced.

Pollution Prevention (or P2 as it is sometimes called) is an approach that any size or type of organization can apply to both protect the environment and save money. In its simplest explanation, it is captured by the familiar saying, "an ounce of prevention is worth a pound of cure". If a company doesn't create pollution or waste, it doesn't have to devote time and resources to storing, handling, transporting, treating or disposing of it. Pollution prevention includes conserving water and energy, "green" purchasing, efficient use of raw materials, replacing hazardous products with less hazardous ones, and modifying processes to reduce waste and pollution.

This "Pollution Prevention Workbook for Business in Nova Scotia" has been designed to introduce small and medium-sized businesses to pollution prevention and assist them in making pollution prevention part of their day-to-day decision making - in effect, to help companies realize that pollution prevention efforts simply make "good business sense"!

The "Pollution Prevention Workbook for Business in Nova Scotia" contains seven modules and a directory of contacts. A business can use the entire workbook or can use individual modules one at a time. The series of modules include:

Introduction to Pollution Prevention
Getting Started with Pollution Prevention
Minimizing Risk in your Business: Pollution Prevention & Risk Management
Pollution Prevention, Water and Wastewater in your Business
Eliminating and Reducing Chemicals in your Business
Solid Waste Reduction and Resource Recovery in your Business
Efficient Energy Use in your Business

"Notice to User"

This manual is intended to provide information on the benefits of pollution prevention for businesses in Nova Scotia. It also provides information on some of the relevant laws in effect in Nova Scotia as of the date of publication. It is not intended to provide information on how to comply with all provisions of those laws which may apply to businesses.

This manual is not intended to contain a complete statement of the law in the area of pollution prevention or the environment. This manual does not replace reading the legislation and regulations. Amendments may be made to the legislation or regulations after the publication of this manual and reference should be made to the most recent official version of the legislation and regulations. Anyone needing specific advice on his/her own situation should seek advice from a lawyer or an environmental expert. Examples and interpretations given are not binding on the Crown.

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Our appreciation is extended to Environment Canada for their exceptional efforts in having this workbook produced. A special acknowledgement is also extended to the Canadian Centre for Pollution Prevention and to Dr. Robert Pojasek for their wealth of knowledge and their contributions to this document.

We encourage businesses to produce copies of the Workbook as a reference for their pollution prevention efforts and to educate employees. The content of the Workbook is not to be altered without permission from the sponsoring agencies. The Workbook is designed to be updated and amended on a periodic basis. Check the Nova Scotia Environment and Labour website (www.gov.ns.ca/enla) to determine if you have the most recent edition.

February 2003

Minimizing Risk in Your Business: Pollution Prevention and Risk Management

Module 3

3.1 Introduction

One of the most pressing business issues for many small and medium sized enterprises (SMEs) is how to minimize operational risks to their workforce, the surrounding community and the environment. Any company that uses chemicals in their operation and has waste dangerous goods to manage is at greater risk of an accident or spill occurring. This can result in costly clean-up and possible financial claims against the company should environmental contamination occur. The concept of pollution prevention-- avoiding the creation of waste or pollutants--is simply risk prevention and management. With well-thought out risk prevention and management strategies, environmental and health risks can be reduced. Businesses which lower their environmental risk are demonstrating due diligence that may limit their future corporate and personal liability. This may translate to lower financial costs, in areas such as lower insurance premiums, improved access to capital and improved opportunities for new investment because they are seen to have better management, and are able to demonstrate regulatory compliance to banks and investors.

By integrating pollution prevention practices and improving risk management in their operation, a business can realize many benefits, including:

- Reductions in potential liabilities
- Reduction of any or all wastes produced by your business including air emissions, liquid waste and solid waste
- Anticipation of future regulation of chemicals and to allow for good business planning
- Reduction of raw material costs, energy costs, water costs, and their waste treatment and disposal costs
- Possible generation of income from the sale of non-contaminated by-products
- Potential improved access to capital and reduction in insurance premiums
- Reductions of risk of spills
- Improved public perception/community good will/improved trust

The community benefits when a company implements pollution prevention because:

- Pollution and the risk of upset/emergency conditions is reduced and subsequently risks to the environment and human health are minimized
- There is less pressure on voluntary fire-fighting resources in rural communities

What is Due Diligence? *Due diligence means taking all reasonable care to prevent an incident. Your company can show due diligence by taking appropriate steps to avoid and adequately handle potential environmental problems.*

The NS Department of Environment and Labour has a presentation on their website on "Due Diligence", intended to help employers and employees understand the due diligence process. To view, visit http://www.gov.ns.ca/enla/ohs/duedilig/index.htm

- Improved business outlook can have social and economic benefits to the community

- Risks to human health are reduced - reducing chemical use in your business helps remove risks for the general public in ways that pollution control measures or clean-up can't
- Pollution is reduced and risks to the environment are minimized

Whatever your incentive, implementing pollution prevention in your business is a smart decision and makes good business sense. You simply become a better business.

In this module, "Minimizing Risk in Your Business: Pollution Prevention and Risk Management", ways in which your company can extend your pollution prevention initiatives to include risk prevention and management will be examined.

"Industry is on a three-stage journey from environmental compliance, through environmental risk management, to long-term sustainable development strategies. In the environmental risk management phase, liability - both corporate and personal - for the cost of environmental clean-ups and claims prompts business executives to adopt more proactive strategies in dealing with environmental issues. Driven by the need to minimize risk, some businesses adopt a precautionary approach that involves anticipating potential risks and preventing environmental hazards. This approach offers a greater flexibility of response than is available through regulatory compliance.

To improve their control of environmental performance, some companies conduct environmental health and safety (EHS) assessments, develop environmental policies, and implement environmental management systems (EMSs). Techniques such as pollution prevention or recycling are used to translate policy objectives into practice.

The risk management approach allows companies to save money by anticipating and avoiding expenditures arising from environmental damage, and by minimizing the cost of complying with future legislation. In addition, operating costs can be reduced through waste minimization, pollution prevention and the elimination of health & safety hazards." [1]

This module includes the following:
- *Kick-Off Quiz*
- *Gathering Key Pieces of Information*
- *Primer: Understanding Risk Manage*
- *Considering Risk in Your Pollution Prevention Plan*
- *Checklist: Minimizing Risk to Emplo and to the Environment*
- *Risk Management and the Workplace*
- *Risk Management and the Communit*
- *Gathering Contact Information*
- *References and Resources*
- *Emergency Numbers Table*
- *Success Stories (throughout)*

Did you know? *Banks do care! An underground leak of gasoline at a service station in Saskatoon, Saskatchewan in 1988 continues to have repercussions in 2002. The owner of an apartment building next to the site discovered the contamination last year after he tried to sell his property and obtained the environmental assessment required by the bank. The bank indicated it would not clear the property for sale until the province's environmental ministry declares it clean of the environmental damage. The contaminated site is currently a parking lot. (From: Canada.com, Feb 12, 2002, www.canada.com)*

3.2 Kick-Off Quiz

Before starting this module, take our Kick-Off Quiz to see how your company currently rates in knowledge and practice of health and environmental risk prevention and management. Scoring works as follows: no = 0 points, somewhat = 1 point, and yes = 2 points. Write your score in the blank provided at the end of each question.

1. Are you familiar with the risks to human health and the natural environment that your company may create? *(If you don't know the risks your company is creating, you are not practicing due diligence, and you and your company are vulnerable to prosecution if an environmental incident occurs.)* ________

2. Do you have a spill prevention plan/procedures plan to respond to accidents such as fuel or chemical spills? *(Well-trained staff that know who to call, and how to find and use spill kits, first aid kits, and other emergency equipment have a critical role in a risk management plan. If you need help getting started, see Appendix C for the Nova Scotia Department of Environment and Labour emergency response plan guidelines, or if you want more information see the CSA Standard – CAN/CSA-Z731-95 at http://alert.scc.ca/std_e/std6215.html.)* ________

3. Are Material Safety Data Sheets (MSDS) prominently displayed in your workplace? *(Under Workplace Hazardous Materials Information System (WHMIS), employers must ensure that MSDS are available to staff.)* ________

4. Are you aware of the financial costs of remediating a contaminated property? *(Beyond any potential costs associated with civil and criminal fines, the cost of even minor clean-ups can easily amount to tens if not hundreds of thousands of dollars.)* ________

5. Do you investigate and document accidents and near misses? *(A history of why environmental incidents occur in your company provides a starting point to making improvements and reducing risk of further accidents.)* ________

Total Score: ________

If you scored between 8-10, good work! Keep it up!
Between 4-7, you are not doing too badly but could likely improve and reduce your company's environmental risk.
Between 0-3, you need help, but there's lots of assistance available. Read on!

3.3 Gathering Key Pieces of Information

There is some baseline information that will be useful to have on-hand as you work through the various modules of the Workbook. By compiling some of the basic data for your company, you better understand your current performance and can identify areas for targeting pollution prevention efforts. Baseline data also provides a reference point for monitoring progress and savings, and allows you to compare your performance against industry standards. In this section of the module, record the key pieces of information. Some of this information may be readily available through your health and safety representative/committee. Information may be available from previous surveys or audits. A facility walk-through and a discussion with key staff will uncover some of the information. You will need to estimate some figures. You probably have access to weekly and monthly information - by converting to annual figures, a better appreciation of the scale of current costs and inefficiencies can be gained, along with the savings that can be achieved.

Did you know? *Cleanup is costly!*

A cleanup of the site of a former transit garage in Hamilton, Ontario will cost an estimated $5 - $7 million. Diesel bus fuel and waste motor oil leaking from the garage contaminated almost an entire city block - 11 buildings will be demolished and thousands of tonnes of earth removed. An inquiry about buying the former garage prompted the investigation. Who pays? In this case, the province of Ontario assumed responsibility because they now own the property. (From: Torontostar.com, June 14, 2002, www.torontostar.com)

Risk Management Data

Types of Accidents	Reasons for Accidents	Cost of Clean-Ups * (Annually)
Days Lost by Employees due to Accidents/ Health-related Problems	**Reasons for Absenteeism**	**Cost of Absenteeism (Annually)**
Past Uses of Property that may Pose Risk	**Costs of Insurance Premiums for Environmental Risks**	**Costs of Fines or Penalties Associated with Environmental Risks**

* Include all costs of clean-ups, human resource time required to deal with the problem, and shut down time.

Nova Scotia Success Story: Stora Enso, Port Hawkesbury, NS

In the early 1990's, Stora Port Hawkesbury (now Stora Enso) recognized that environmental issues were becoming increasingly important and that these issues created risks to the company's relationship with the community, regulators and environmental organizations. The company began to develop an environmental management system in order to effectively manage those environmental risks. It adopted an environmental policy and initiated an extensive environmental education and training program for all its employees and contractors. The program developed by Stora Port Hawkesbury was designed to prevent pollution and reduce risks.

The company's effort was recognized in the courts a few years later when Stora was charged under the Federal Fisheries Act for an oil spill at the mill which resulted in the release of oil to the Strait of Canso. In its defense the company was able to demonstrate that it had done all that was possible to:

- Prevent spills by applying best practices and training its employees
- Respond appropriately to minimize any damage resulting from the spill
- Notify officials immediately

The decision essentially set a new standard for due diligence.

3.4 Primer: Understanding Risk and Risk Management

A risk is defined as "the probability of suffering harm from a hazard" (Hill, 1997). The harm includes environmental impacts and health impacts but also could be interpreted to include reduced revenues and profits, negative impact on community relations or employee morale, and lack of confidence by the investment community.

In industry, a wide variety of practices can endanger the natural environment, employees, and the surrounding community. Examples of these types of hazards may be pollution of a river, oil spills, exposure of employees to toxic chemicals, accidents on the job, release of air emissions, and contamination of wells. In addition, a company may risk financial losses and legal liabilities, a negative perception of the business by members of the local community, and ultimately impact on sales and the survival of the business itself.

It is often suggested that a manager's job is to manage the risks that influence a company's viability. If the risks cannot be fully prevented, and many cannot, it should at least be managed to a reasonable level.

What is risk management?
Risk management is the attempt to reduce and/or minimize risks and the impacts of risk. A simple example of risk management is

The province of Nova Scotia has spent approximately $9 million on the cleanup of PCB-laced Five Island Lake. The chemical spilled from rusting transformers at an old junkyard and contaminated soil and the surrounding waterways. The province has been cleaning up the site since the incident was discovered in 1989. (From: Canada.com, Jan 22, 2002, www.canada.com)

The majority of oil spills reported to the Nova Scotia Department of Environment and Labour each year are from domestic oil tanks. Clean-up costs can range from several thousand dollars to several hundred thousand dollars and have been increasing. In August, 2002, an oil tank rupture in a three unit apartment building in the HRM resulted in a spill of 900 litres of home-heating fuel. Two adjacent properties were also contaminated. The apartment owner estimates a $170,000 clean-up bill, only partially covered by insurance. (From: Daily News, September 9, 2002)

slowing down when driving conditions are not ideal (e.g., s now, rain, and fog). Slowing down may not prevent an accident, but it certainly reduces the risk of having an accident. It also lessens the impacts of an accident. Keeping a drum of oil stored in a protected area that is surrounded by a containment berm and located away from drains or ditches may not prevent a spill or leak from happening. It can, however, reduce the risk of the oil inadvertently entering a waterway and causing a major problem.

In industry, the risks of concern are those that may harm the company, the employees, the local community, and the natural environment. Formally incorporating pollution prevention and risk management practices into the operating practices of your business are ways to prevent environmental and health risks resulting from your company's operations and demonstrate due diligence.

3.5 Considering Risk in Your Pollution Prevention Plan

Pollution prevention is by definition a risk management approach. Risk management elements will often form the core of the pollution prevention program. You may already have many elements in place in your business: a workplace Occupational Health and Safety Program is one example. Another is an emergency response and spill prevention plan. Use these risk management components as a "springboard" to develop your pollution prevention program.

Chevron has gone as far as naming its oil tankers after senior executives and members of the Board of Directors to encourage responsible care and due diligence.[2]

If your company is developing a pollution prevention plan (as described in Module Two), the following explains how a company can incorporate risk management elements at each planning step.

Step 1. Commitment and Policy

It is during the first step of pollution prevention planning – commitment and policy – that you need to make sure that environmental risks facing the company are part of a written pollution prevention policy. At this stage, a pollution prevention team is also being established. Consider including staff members on the team who will bring a risk management perspective to the planning process – this may be a legal representative or a member of the OHS committee.

Step 2. Baseline Review

Pollution prevention planning requires an understanding of production processes and the sources of pollution and wastes in a company. As part of this baseline information on the flow of products, information on the environmental and health risks that result from the company's processes needs to be gathered. The following points should be kept in mind as this information is collected and assessed:

What risks are present? (For example, chemicals, unsafe machinery, fuels)
Who or **what** is likely to be exposed to the risk? (That is, who or what may be affected, such as workers, members of the local community, or the natural environment)
How will that exposure likely occur? (Will it reach the recipients through the air, water, direct contact, etc.? How might a spill reach a watercourse? What is the prevailing wind direction?)
What is the magnitude/severity of a potential incident? (For example, a spill inside the plant is a mess, but a spill to the outside environment can result in contamination and costly clean-up)

To streamline the pollution prevention and risk management process, try to discuss both issues during the same meetings and include both in the same progress reports.

Some specific questions that can be asked to identify if risks are present:

- Does your company store chemicals and/or store gases under pressure?
- Are there aboveground or underground fuel tanks on the property?
- Are the chemicals used considered a toxic substance under federal legislation or a dangerous good by provincial legislation?
- Do employees use heavy or dangerous machinery?
- Are effluents emitted that could pollute water resources, the soil, and/or the air?
- Are waste dangerous goods generated and stored on the property?

In defining these risks, ensure you consult with employees and neighbouring businesses. Consider including other interested stakeholders such as customers, suppliers, regulators, environmental organizations, and community groups.

Step 3. Planning

Once the baseline information is collected, you then develop the pollution prevention plan – detailing potential opportunities, prioritizing options, identifying objectives and targets, and assigning responsibilities and timelines. This is the stage where you identify how to reduce and/or minimize the risks, weigh risk management options and prioritize risks. Perhaps your priority pollution prevention activities are those that address the riskiest aspect of your operation. Since there may be numerous health and environmental risks, you require a systematic way to prioritize the risks. Some factors to consider are:

- The acceptability of the risk and the management options
- Whether you have the right type and level of insurance
- The availability of technological options to reduce the risk (financial impact and potential environmental impact)
- Possible harm to environment and human health dependent on

possible exposure routes and likelihood of incident
- People's values, perceptions, and ethical considerations related to environmental and health risks
- The general political climate
- The views of the public, business, labour and other interest groups in your community
- Judicial, policy and litigative constraints or risks
- The existence of risk management programs

Typically, risks that are the most hazardous and widespread get top priority.

Step 4. Implementation

Once your pollution prevention plan has been developed, it is time to put it into action. This involves identifying staff training or incorporating pollution prevention into existing training programs (such as risk management training, OHS training, spill prevention training).

Step 5. Monitoring and Reporting

Studying the status and progress of a pollution prevention plan and risk management efforts is a crucial step. An important element of monitoring can be public perception and communication to gather views and opinions related to risk management. Determine if stakeholders believe the process is effective. Monitoring of the impacts on the affected environment will also need to be carried out. Progress reports help to keep your staff and other stakeholders informed and involved. Public reporting is particularly necessary in this phase, as public opinion on health and environmental risks will need to be accounted for.

Step 6. Review, Evaluation and Improvement

To ensure your pollution prevention plan is effective, it is important to review, evaluate and improve your approach on an ongoing basis. Progress reports, communication with employees, government, and the public, attention to the development of new technologies and/or products that may affect your plan, and reflection on your growing pollution prevention and risk management experiences should be considered.

One tool for ensuring that environmental risks have been properly addressed and pollution is prevented, is the implementation of a formalized environmental management system (EMS). As covered in Module Two, many such systems exist but the most recognized and accepted system is the ISO 14000 that uses standards that have been adopted by the International Organization for Standardization known as ISO. You may already be aware of the organization if you have an ISO 9000 quality management system in place or your customers may have required that you satisfy this standard. In at least two cases in Canada, courts in Alberta and Ontario have required companies to adopt ISO 14001 based environmental management systems to reduce further risks to the environment after accidents occurred.

Nova Scotia Success Story: Precision Finished Components, North Sydney, NS - An ISO 14001 Example

Established in 1987, Precision Finished Components (PFC), manufacturer of automotive parts and assemblies, is a Tier 1 supplier to GM and other major automotive companies. PFC has 3 facilities, two of which, PFC Powertrain and PFC Tesma, are located in North Sydney, NS and one in Woodbridge, ON. A total of 350 employees are employed with the company through the three facilities. PFC is supported by numerous departments, such as Engineering; Maintenance; Research & Development; Toolroom and Human Relations. PFC has also obtained QS 9000 Certification and is striving towards ISO 18001, dependent on draft acceptance.

In February 1999, PFC became only the 2nd company in Nova Scotia to receive a Certificate of Registration to the ISO 14001 EMS standard for their PFC Tesma facility. In 2001, based on the successful results of a surveillance audit performed by AQSR Canada Inc., the company has included PFC Powertrain and PFC Woodbridge under the scope of the certification.

Through the ISO 14001 certification process, a comprehensive review of the environmental aspects of the company's manufacturing and support operations and facilities, and the environmental significance of their impacts was performed. The quantity of power used and the amount of blanking oil consumed were two aspects determined by the review to have significant impacts on the environment. To reduce these impacts, two projects were identified. With regard to power, PFC modified the electrical system to increase the electrical power factor and reduce the amount of electricity used. The second project, currently underway, involves changing the method used to apply blanking oil in the production process. PFC is researching the change from a spray method of oil application to a roller applicator. This will result in a substantial reduction in the amount of:

- oil used
- aerosol oil in the air
- waste oil left on both the finished parts and the metal scrap
- oil on the shop floor

Several other projects have been initiated which will continue to improve the heath & safety of employees, the environment, and the company's bottom line.

As a requirement of ISO 14001, PFC continuously monitors the company's manufacturing and support operations to ensure that changing conditions are reflected in revised aspects and impact analysis. PFC's commitment and dedication to the health and safety of its employees, community, and environment, clearly show through their ISO 14001 accreditation.

Environmental Benefits:
For the projects noted above:

- projected reduction in 100kVA of energy used annually

- projected reduction in 34 000 litres of blanking oil consumed annually

Economic Benefits:

For an initial outlay of $38,000 for electrical changes, and $75,000 for blanking equipment modifications, it is projected that direct cash savings of $100,000 annually will be realized. In addition, implementation of the ISO 14001 system is also expected to:

- maintain the current customer base
- attract new customers
- lower insurance rates
- reduce incidents that result in liability
- facilitate the attainment of permits and authorizations

Social Benefits:

- enhanced public image
- health and safety improvements by reduced aerosol oil emissions and oil on the shop floor

For more information contact:
Precision Finished Components
53 Memorial Drive, North Sydney, NS B2A 3S6

3.6 Checklist: Minimizing Risk to Employees and to the Environment

This section is a self-assessment checklist to help you to determine which steps your company has already taken and what potential opportunities to minimize risks may exist. Note that some of these questions will overlap with questions from the "Eliminating and Reducing Chemicals in Your Business" module. Review the checklists in that chapter for further opportunities.

A. Checklist – General				
	Yes	No	Don't Know	Not Applicable
Do you make sure that all containers with hazardous materials are clearly labeled and dated?				
Are Material Safety Data Sheets (MSDS) easily accessible to employees and kept up-to-date?				
Does your company use water-based materials rather than solvent-based materials?				
Are you able to purchase only the amounts and types of chemicals needed for specific projects?				
Do you keep chemical storage areas free from traffic and exposure to the elements?				
Is chemical inventory regularly inspected for leaks and corrosion?				
Do you have leak detection equipment?				
Are leaks repaired and spills cleaned up immediately?				
Is the floor or property designed and constructed to prevent contamination of soil, surface or groundwater in the case of a spill?				
Have you substituted hazardous substances with less hazardous substances?				
Is inventory monitored to reduce accumulation of over-aged products?				
Is there a "first-in, first-out" policy with chemicals?				
Do you have "good housekeeping" procedures in place for using chemicals?				
Are employees trained in how to work safely and in the hazards associated with their work?				
Do you have staff capable and available to handle chemical emergencies?				
Do employees know where to locate emergency equipment?				

3.7 Risk Management and the Workplace

To ensure the health and safety of your employees, it is important to have a safe working environment in which health and safety risks are eliminated and/or reduced. The Nova Scotia Occupational Health and Safety Act requires an occupational health and safety (OHS) policy and an OHS representative in companies with at least five regular employed staff (i.e., greater than four weeks). A business with 20 or more staff must also have an OHS committee and a Health and Safety program that includes the company's work procedures, hazard assessment procedures, responsibilities and health and safety monitoring, along with many other elements. The OHS Act also defines four rights of workers: the right to know, the right to participate, the right to refuse unsafe work and the right to grieve or make a complaint. The right to know is enshrined in most labour laws in Canada through the Workplace Hazardous Materials Information System (WHMIS).

Some additional key information to be aware of with regards to health and safety in the workplace:

- Employees have the right to work with their employer to identify health and safety hazards and make recommendations.
- As an element of the workers' right to know, programs such as WHMIS are in place. Under WHMIS, employers must ensure that all containers are labelled, and Material Safety Data Sheets (MSDS) are available and updated. There are also requirements for training, posted information, etc. Employers must ensure that employees working with, or in close proximity to, dangerous and/or toxic materials are properly informed about the risks, and properly trained in the safe use of these materials.
- If workers believe that the use or operation of a machine or thing may be harmful to them or to fellow workers, they have the right to refuse to work. The employee(s) does not have to prove that a danger exists; if they perceive a danger in the workplace, they do not have to work. The onus is then on the employer to prove the work is safe, or improve it so that it is deemed safe. An OHS Committee may become involved in the resolution of the refusal.
- If workers believe that they have been discriminated against, or discrimination has been threatened by the employer, due to health and safety issues, they have the right to make a complaint or file a grievance.

Merging Pollution Prevention and OHS

Merging pollution prevention and health and safety programs was previously mentioned in Module 1 or the Workbook. If you already have an OHS program in place in your business, consider the following:

- *Re-establish the OHS committee as an Environment, Health and Safety Committee, recognizing the broader scope of the committee's priorities. Add environmental issues to the agenda.*
- *Establish what activities already undertaken by the OHS team may overlap with pollution prevention goals (it may be a matter of terminology).*
- *If you use a checklist for monthly OHS inspections, re-tool this to include environmental issues.*

Need more Info on OHS? Visit the Nova Scotia Department of Environment and Labour's - Occupational Health and Safety Division (www.gov.ns.ca/enla/ohs)

For an OHS Checklist for Small Business, go to www.gov.ns.ca/enla/ohs/OHSCSB02.pdf

For WHMIS regulations, go to www.gov.ns.ca/enla/ohs/whmis.pdf

How does the public perceive risk and how does a business deal with their perceptions*? Dr. Peter Sandman is a well-known U.S. consultant, writer and speaker on risk communication who works with a wide range of industry and government clients. He advocates that companies must recognize that the general public's perception/definition of risk includes components of "outrage" – things that may not be serious hazards but that simply anger and frighten people. The public pays attention to outrage factors while the experts focus on the "hazards" (technical risks). To help organizations effectively communicate risk information to the public, Dr. Sandman has developed guidelines based on identifying strategies for managing, minimizing or preventing the outrage. Among his recommendations, he urges organizations to accept and involve the public as a legitimate partner, to ensure that the needs of the media are met, and to use simple, non-technical language in communicating. For more information on Dr. Sandman's work, visit www.psandman.com.*[3]

3.8 Risk Management and the Community: Communication is Key

To ensure your risk management plan works towards the best interests of your business and the local community, it is important to establish communication. In other words, your company must be in touch with local citizens' concerns, opinions, and ideas concerning risk management and the health of people and the environment.

Working with your Community on Risk Management
The following are ways you can establish a relationship between your company and the community when developing your risk management plan.

- Company tours: Host open houses and tours of your facility. Such openness will not only create a feeling of trust, it may also inspire citizens to become interested in your business's activities and suggest ways you can work together to ensure health and environmental safety.
- Communication and information: It is vital that you communicate all the ways that your facility's activities may influence the surrounding community, both in terms of health and safety, and environmental integrity. It is also important that you listen to the local residents and hear their opinions, concerns, and ideas related to health and environmental risk management. You can establish lines of communication with the community through public meetings, open houses, presentations, special events, advertisements, committees, etc. Talking to your immediate neighbours is a good start. The language you use in communicating should be carefully designed to ensure understanding. Words that have scientific meaning as well as generally understood meaning should be avoided (probable vs. probability; significant vs. statistically significant, etc.). Communications should be targeted at a level to ensure that all members of the community will understand and appreciate the information.
- Special programs: Your company may wish to consider offering special programs that enhance the environmental integrity of the area, restoration and clean-up projects of local parkland, forests, streams, beaches, adopt-a-highway programs, supporting/assisting neighbourhood schools with their environmental programs. Participating in such projects will help you get to know the characteristics of the surrounding local environment and the local community, which may help you in the development of an environmental risk management strategy.
- Cooperation with special interest groups: Working together with interest groups achieves the common goal of protecting the environment, and promoting health and safety. Groups to consider are universities, public schools, government, the local

fire department, and environmental and advocacy groups. These groups will likely be eager to establish communication with you, and assist you in your risk management plans.

3.9 Gathering Contact Information

It is important to have emergency contact information "at your fingertips". Take time to collect the names and phone numbers of the appropriate contacts within your organization and record this information in the "Emergency Phone Numbers" table. This table also contains up-to-date emergency phone numbers. You should reproduce this list for posting in prominent locations (e.g., by all telephones) in your business. Review the information regularly to make sure it is up-to-date.

3.10 References and Resources

References

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Emergency Phone Numbers

Police, Fire, Medical, Poison Emergency 911

Company Contact	Police, Fire, Medical, Poison Emergency
	911

Environment Emergency

Company Contact	NS Department of Environment & Labour Environment Canada Canadian Coast Guard
	1-800-565-1633

Occupational Health and Safety Emergency

Company Contact	NS Department of Environment and Labour (Occupational Health and Safety Division)
	1-800-952-2687

Public Safety
Office of the Fire Marshal / Boilers / Elevators / Power Engineers

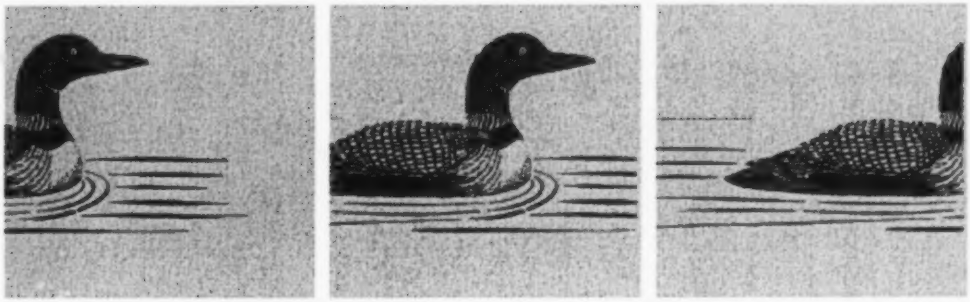
Company Contact	NS Public Safety & Office of the Fire Marshal
	1-800-559-3473

Pollution Prevention Workbook for
Business in Nova Scotia

MODULE

4

Pollution, Water and Wastewater in Your Business



Eco-Efficiency
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NOVA SCOTIA
Environment and Labour

Introduction

Pollution and waste costs your business money and impacts the environment. By preventing pollution the environment is better protected and typically business liabilities are reduced, while productivity and competitiveness are enhanced.

Pollution Prevention (or P2 as it is sometimes called) is an approach that any size or type of organization can apply to both protect the environment and save money. In its simplest explanation, it is captured by the familiar saying, "an ounce of prevention is worth a pound of cure". If a company doesn't create pollution or waste, it doesn't have to devote time and resources to storing, handling, transporting, treating or disposing of it. Pollution prevention includes conserving water and energy, "green" purchasing, efficient use of raw materials, replacing hazardous products with less hazardous ones, and modifying processes to reduce waste and pollution.

This "Pollution Prevention Workbook for Business in Nova Scotia" has been designed to introduce small and medium-sized businesses to pollution prevention and assist them in making pollution prevention part of their day-to-day decision making - in effect, to help companies realize that pollution prevention efforts simply make "good business sense"!

The "Pollution Prevention Workbook for Business in Nova Scotia" contains seven modules and a directory of contacts. A business can use the entire workbook or can use individual modules one at a time. The series of modules include:

Introduction to Pollution Prevention
Getting Started with Pollution Prevention
Minimizing Risk in your Business: Pollution Prevention & Risk Management
Pollution Prevention, Water and Wastewater in your Business
Eliminating and Reducing Chemicals in your Business
Solid Waste Reduction and Resource Recovery in your Business
Efficient Energy Use in your Business

"Notice to User"

This manual is intended to provide information on the benefits of pollution prevention for businesses in Nova Scotia. It also provides information on some of the relevant laws in effect in Nova Scotia as of the date of publication. It is not intended to provide information on how to comply with all provisions of those laws which may apply to businesses.

This manual is not intended to contain a complete statement of the law in the area of pollution prevention or the environment. This manual does not replace reading the legislation and regulations. Amendments may be made to the legislation or regulations after the publication of this manual and reference should be made to the most recent official version of the legislation and regulations. Anyone needing specific advice on his/her own situation should seek advice from a lawyer or an environmental expert. Examples and interpretations given are not binding on the Crown.

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Eco-Efficiency Centre
Nova Scotia Environment and Labour
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Alberta Department of Environment

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Our appreciation is extended to Environment Canada for their exceptional efforts in having this workbook produced. A special acknowledgement is also extended to the Canadian Centre for Pollution Prevention and to Dr. Robert Pojasek for their wealth of knowledge and their contributions to this document.

We encourage businesses to produce copies of the Workbook as a reference for their pollution prevention efforts and to educate employees. The content of the Workbook is not to be altered without permission from the sponsoring agencies. The Workbook is designed to be updated and amended on a periodic basis. Check the Nova Scotia Environment and Labour website (www.gov.ns.ca/enla) to determine if you have the most recent edition.

February 2003

Pollution Prevention, Water and Wastewater in Your Business

Module 4

Reducing water use and waste water disposal makes environmental and financial sense!

This module includes the following:

- *Kick-Off Quiz*
- *Gathering Key Pieces of Information*
- *Primer: Water and Wastewater*
- *Environmental Legislation*
- *Checklists: Assessing Opportunities and Best Practices for Your Business*
- *Tools and Tips for Business: Publicizing Your Water Efficiency Efforts*
- *References and Resources*
- *Opportunities Action Table*
- *Success Stories and Case Studies (throughout)*

4.1 Introduction

Water is one of the earth's most precious, yet undervalued, resources. In Canada, we have long taken for granted the abundant supply of fresh water. In fact, we are the second-highest users of water in the world (we use an average of 5000 litres per person per day, mostly for agriculture). We turn on the faucet and get seemingly unlimited running water and then send our used water along with various contaminants, into sinks, floor drains and toilets, and into private or public sewer systems. These practices have an impact on the health of our environment, the availability of water, and the use of materials and energy.

The demand for water continues to rise, but pollution and overuse are shrinking the safe and secure supply. In Nova Scotia, recent dry summers have resulted in droughts in some areas, and caused communities to restrict water use. Water quality problems are being encountered in Nova Scotia's fresh and coastal waters such as public beach closures, fish kills, shellfish harvesting closures, and algal blooms. In 2001, 31% of classified shellfish harvesting areas were closed due to contamination. In the mid 1980's, drinking water in some Nova Scotia communities was found to have residues of tetrachloroethylene, a chemical used in dry-cleaning operations. Sources of contaminants are numerous and include industrial, agricultural, community and individual homeowner activities such as improper storage and disposal of waste chemicals and dangerous goods, leaking fuel oil tanks and poorly operating septic tanks. Some municipalities continue to dispose of wastewater directly into rivers and oceans. For example, Halifax Harbour receives over 150 million litres per day of untreated water from both sanitary and storm sewers. The end result is that our water and wastewater systems are stressed from misuse and pollution.

Businesses have a huge impact on water resources and can play an important role in protecting our water resources. The Greater Vancouver Regional District estimates that buildings and businesses are responsible for 33% of water consumption and over three-quarters of key wastewater pollutants, in the Vancouver area [1]. Businesses use water for a variety of processes, and dispose of wastewater and other substances that can affect our waterways and coastal areas. Water use and wastewater disposal also represent a significant business expense. So in addition to making good environmental sense, better use and disposal makes economic sense. In fact, a survey conducted by Nova Scotia Department of Environment and Labour in 2000 indicated that close to 25% of small businesses took steps to reduce their water use and close to 50% were interested in receiving information on water conservation.

Using water wisely through pollution prevention practices can have many benefits to a business, including:

- Lower water costs
- Lower costs for managing wastewater
- Assist in achieving compliance with legal requirements
- More efficient processes
- Greater competitiveness
- An enhanced public image

By being water efficient, companies also benefit the larger community by:

- Assisting to safeguard local water supplies
- Reducing pollution and health risks
- Extending the useful life of existing water supply
- Reducing pumping and treatment costs for wastewater treatment facilities
- Postponing infrastructure development/plant expansions
- Minimizing the impact of drought

Whatever your incentive, using water wisely in your business is a smart decision and makes good business sense. By using a pollution prevention approach in your company, you can eliminate pollution and inefficiencies. You simply become a better business.

This module, "Pollution Prevention and Water and Wastewater in Your Business" will provide your business with practical information, ideas, tools, and resources on how to improve water efficiency in your operation using pollution prevention.

Did you know? *Manufacturing accounted for 14% of water withdrawals in Canada in 1996. The three main industrial users were paper and allied products, chemicals, and primary metals.*[2]

Regional Success Story: Chateau Halifax, Halifax, NS

In the early 1990's Chateau Halifax (now the Delta Halifax) undertook a water and energy conservation program. They installed water restrictors in their showers and toilets in all the guest rooms, resulting in a savings of 136 litres/room/day or 13.6 million litres/year. Alvaro Martinez, of the Chateau Halifax stated; "A very positive measure, good for the environment and good for the bottom line."

Did you know? *Plumbing leaks account for 14 percent of water consumed in the home, according to a study sponsored by the American Water Works Association.*

4.2 Kick-Off Quiz

Before starting this module, take our Kick-Off Quiz to see how your company currently rates on awareness of water and wastewater management. Scoring works as follows: no = 0 points, somewhat = 1 point, and yes = 2 points. Write your score in the blank provided at the end of each question.

1. Do you know how to read your water meter properly? *(Understanding your water bill and regular monitoring of water use provides early indicators of problems.)* ________

2. Do you know the breakdown (rough percentages) of water uses in your company, for example: cooling and heating, domestic uses, process rinsing, cleaning activities, kitchens, laundries, landscaping, water treatment regeneration, evaporation, and others? *(Understanding how you use water in your organization will help you to develop the most cost effective pollution prevention program.)* ________

3. Do you know what your water and sewer charges are? *(By understanding your total costs, you can better appreciate the economic benefits to reducing water use.)* ________

4. Do you know what chemicals are going down the drain? *(If you don't know what's going down the drain and how much is going down the drain, you may be in violation of municipal, provincial and/or federal legislation.)* ________

5. Are you doing simple things like leak inspections, eliminating unnecessary uses and using timers? Are these practices standard throughout the operation? *(Many of these pollution prevention practices just make good business sense to implement. Make pollution prevention practices normal procedure in your business.)* ________

Total Score: ________

If you scored between 8-10, good work! Keep it up!
Between 4-7, you are not doing too badly but could likely improve and reduce your company's environmental impacts.
Between 0-3, you need help, but there's lots of assistance available. Read on!

Nova Scotia Success Story: Farnell Packaging Ltd., Dartmouth, NS
Letting the Numbers Do the Talking

Farnell Packaging Ltd. located in Dartmouth, Nova Scotia, specializes in the manufacturing of blown film plastic packaging. Building on the successful implementation of other water reducing initiatives, Farnell installed a closed loop Glycol-based cooling system in 1999. This replaced an older system that relied upon city water to directly cool equipment. The old system used the water once then discharged it to the sewer systems. The new cooling system uses glycol instead of water and re-circulates it so it is reused over again. Implementation of the closed-loop glycol based system resulted in substantial benefits including estimated savings of greater than $5,000 per year and an 85% reduced usage of the Halifax Regional water supply. Farnell staff anticipates cost savings will pay for the capital investment in new equipment in just over one year. Further, current billing information suggests a reduction from approximately 12,000m3 per year, to 1200m3 per year (or approximately 90%). At a cost of approximately $0.25/m3, the cost savings can be considerable. Farnell reports this change drew an almost immediate visit from a Halifax Regional Municipality Water Commission inspector to ensure the water meter was not broken!

For further information contact
Farnell Packaging Ltd.
30 Ilsley Ave., Dartmouth, NS
B3B 1L3
http://www.farnell.ns.ca/
or
visit their Eco-Efficiency Success Story on Industry Canada's website at
http://strategis.ic.gc.ca/SSG/1/ef00032e.html

"If you can prevent water from going into the sewer system, you save the costs of not only purchasing the water, but also of disposing and managing the system" - Chuck Bennett,
Oland Brewery, Halifax, NS

4.3 Gathering Key Pieces of Information

There is some baseline information that will be useful to have on-hand as you work through the various modules of the Workbook. By compiling your company's data on water usage and costs, you better understand your current performance and can identify areas for targeting pollution prevention efforts. Baseline data also provides a reference point for monitoring progress and savings, and allows you to compare your performance against industry standards. In this section of each module, record the key pieces of information. Some of this information may be readily available through regular billing from utility providers. Information may be available from previous surveys or audits. A facility walk-through and a discussion with key staff will uncover some of the information. You will need to estimate some figures. You probably have access to weekly and monthly information by converting to annual figures, a better appreciation of the scale of current costs and inefficiencies can be gained, along with the savings that can be achieved.

Water and Wastewater Data

Where Water is Used	Quantity (Annually)	Cost (Annually)*
-production line		
-office		
-general landscaping		
-maintenance		
-leaks/losses		
-other		
Total Water Use		
Total Wastewater Generated		
Wastewater Treatment		

*Keep in mind these types of costs: water withdrawal fees and permits, water metering charges, sewer-use fees, in-house water pretreatment, and wastewater treatment. You may have a total cost that you will need to pro-rate.

4.4 Primer: Water and Wastewater

All life is dependent on water resources for survival.

Only 3% of our water is fresh and only 1% of the fresh water is suitable for drinking. Our drinking water comes from two main sources – surface water and groundwater. Surface water includes sources such as rivers, streams, lakes and reservoirs. Groundwater includes groundwater aquifers – air spaces underground that become filled with water. Approximately 60% of the world's fresh water is held underground.

Our water supply is subject to pressures on both quantity and quality. Threats to water quantity include natural conditions such as drought, and excessive use in localized areas. For example residential use (lawn care, car washing) and inefficient agricultural and industrial use. The threats to the quality of our water resources are numerous and include contaminated run-off from industrial sites, poorly managed forestry or agricultural activities, road salt, municipal wastes, poorly maintained on-site sewage systems, underground storage tanks, pesticides, and deposition of air contaminants.

Sources of water pollution are classified as "point sources" (the source is known and specific) and "nonpoint sources" (the source is unknown or nonspecific). Examples of point source contamination are: release of industrial effluent directly into surface waters, treatment plants, sewage outfalls, siltation from vegetation removal or construction, and thermal pollution from power plants. Many of

Did you know? *In Nova Scotia we have 6700 lakes, 100 rivers, and 7400 km of shoreline.*[2] *The province released "A Drinking Water Strategy for Nova Scotia" in the fall of 2002. View it at http://www.gov.ns.ca/enla/water/h2ostrat.pdf*

Did you know? *In a 1993 survey by the Canadian Federation of Independent Business (CFIB) of over 8,000 small and medium-sized businesses in Ontario, 30 percent of respondents indicated that the cost of water, sewers and waste disposal was a major problem for them.*

the current efforts to manage water pollution have been focused on controlling point source discharges through by-laws, approvals and enforcement action regulations.

Regional Success Story: Oland Brewery, Halifax, NS

In the early 1990's, as a result of an environmental audit, Oland Brewery undertook a number of environmental improvements. They rethought their manufacturing process and began to recycle rinsewater in their bottle wash cycle, which resulted in the conservation of 30 million gallons of water/year - a savings of about $50 - 60,000 per year. They also undertook some solid waste reduction measures (see Module Six).

Nonpoint source pollutants are more difficult to identify. They fall into several major categories: sediments, nutrients, heavy metals, chemicals and pathogens. Nonpoint sources include poor land management practices that generate polluted runoff, failing on-site sewage disposal systems, urban stormwater runoff, recreational boating, physical changes to stream channels, the destruction of wetlands and clearing of vegetated areas near streams. Much of the threat to coastal waters and freshwater systems is caused by nonpoint source pollution.

A common pollutant in Nova Scotia is domestic sewage. Because receiving waters and lands can only accept small amounts of sewage before becoming polluted, it is important to treat our wastewater to protect human health and the environment. About 45% of Nova Scotians have on-site sewage disposal systems to treat and dispose of their home sewage (mostly in rural areas) and about 25% have their wastewater collected and treated at central treatment facilities. There are 290 municipal and privately owned sewage treatment facilities in cities, towns and communities in the province. Treatment facilities accelerate the organic decomposition processes, which take place in nature. This is performed by a combination of physical, biological, and chemical treatment stages. Treatment of our wastewater can also include removal of objectionable items, nutrients and heavy metals. The remaining 30% of Nova Scotians are still discharging untreated sewage into rivers, estuaries and coastal waters.[3]

4.5 Environmental Legislation

Federal Regulations

Several federal agencies have some responsibility for water and wastewater management. Health Canada and Environment Canada are two departments that have specific legislative authority in these areas.

- The Canada Health Act, 1985 gives Health Canada the authority to establish national Drinking Water Guidelines. Health Canada works very closely with provincial and territorial agencies to coordinate the development and implementation of these standards.

- Environment Canada has direct authority in some areas:
  - Canada Water Act, 1985
  - Canadian Environmental Protection Act, 1999 (CEPA) (Environment Canada shares some of this authority with Health Canada)
  - Fisheries Act, 1985

Health Canada and Environment Canada strive to coordinate their activities with provincial and territorial counterparts, both informally and through negotiated agreements. However they do work independently in some areas. For example, under CEPA, there are specific regulations for many point sources of water pollution (e.g., for the release of dioxins and furans in Pulp and Paper mill effluents). The general provisions of the Fisheries Act prohibit the deposit of any deleterious substances into any waters where there are fish or fish habitat. Under the Fisheries Act, there are also specific regulations that apply to the oil refining, mining, potato, meat and poultry processing facilities, chlor-alkali, and pulp and paper industrial sectors.

To see the regulations regarding the release of dioxins and furans in Pulp and Paper mill effluents, visit Environment Canada's Environmental Acts and Regulations website: http://www3.ec.gc.ca/EnviroRegs/Eng/SearchDetail.cfm?intReg=161

To review regulations in the Fisheries Act regarding the release of deleterious substances, visit: http://laws.justice.gc.ca/en/F-14/text.html

To see the specific regulations related to oil refining, mining, potato, meat and poultry processing facilities, chlor-alkali, and pulp and paper industrial sectors, visit: http://www3.ec.gc.ca/EnviroRegs/Eng/SearchDetail.cfm?intAct=1017

Provincial Regulations

The province has the responsibility of managing all water resources, watercourses, and the allocation of water. The Nova Scotia Department of Environment and Labour is responsible for:

- Developing and implementing provincial water and wastewater management regulations, policies, strategies and programs designed to protect public health, safety and the environment.
- Developing management practices for drinking water supply protection.
- Establishing water and wastewater effluent quality standards and objectives
- Allocating provincial water resources to a variety of users.
- Collecting and reporting on ambient water monitoring data.

Under the Nova Scotia Environment Act it is an offence to release a substance into the environment that may cause a significant adverse effect (impairing or damaging the environment).

Where there are public health issues related to water, the Nova Scotia Department of Health also plays a role in managing and monitoring water quality.

In 2002, Nova Scotia made the Canadian Drinking Water Quality Guidelines a requirement under environmental regulations. As well, there have been new certification requirements for operators of water treatment facilities along with improved requirements for the construction of water wells.

To see the Summary of Canadian Drinking Water Quality Guidelines, visit: http:// www.hc-sc.gc.ca/ehp/ehd/catalogue/bch_pubs/ *drinking_water_quality_guidelines/toc.htm*

For an up-to-date list of certified Well Drillers, Diggers, Pump Installers and Public Drinking Water Supply Contractors, visit: http://www.gov.ns.ca/enla/emc/CertWell.htm

What activities involving "water" require an approval from the Province of Nova Scotia?

Under the Activities Designation Regulations the following activities require an approval from the Nova Scotia Department of Environment and Labour:

- The withdrawal of water from a surface water or groundwater (in an amount greater that 23,000 litres per day.
- The alteration of a watercourse (stream, river, lake, etc) or water resource (wetland, swamp, bog, etc.) or construction near a watercourse or water resource.
- The construction, operation and reclamation of sewage works, storm drainage works and septage works.
- The construction, operation or reclamation of water supply, treatment, and/or distribution facilities or works.

There are many activities and types of businesses that require an approval from the Nova Scotia Department of Environment and Labour. Modifications to a designated activity also require an approval. For information on approvals, contact your local Department of Environment and Labour office (see Module 8 for contacts) or visit the website at http://www.gov.ns.ca/just.

Is there other provincial legislation that may affect my business?

An on-site septic system is required on properties not serviced by municipal wastewater system in accordance with the Nova Scotia On-Site Sewage Disposal System Regulations.

To review the On-Site Sewage Disposal System Regulations or the Activities Designation Regulations, visit: http://www.gov.ns.ca/just/regulations/

If your business is involved in any of the activities designated in the Activities Designation Regulations, you are required to have an approval from Nova Scotia Environment and Labour.

The Department of Service Nova Scotia and Municipal Relations has developed a model sewer discharge bylaw (www.gov.ns.ca/snsmr/muns/infr/sew/discharge.stm) which provides an example of how municipalities can regulate discharges to the public sewer systems. A number of Nova Scotia municipalities have developed their own municipal bylaws based on this model.

Contact your local municipal office to obtain information about sewer discharge bylaws in your area. These contacts are provided in Module Eight of the Workbook.

Municipal Regulations

Do Sewer Use Bylaws apply to my business?

If your business discharges to a Municipal sewer, you may have to comply with a Municipal Sewer-use Bylaw. These bylaws may apply to businesses if they use water from and /or discharge water to a public utility. In general these bylaws require that no person shall discharge matter of any type or at any temperature or in any quantity which may be or may become a health and safety hazard to a wastewater system's employee or which may become harmful to a wastewater system (e.g., interfere with the proper operation of the system). Most bylaws include parameters (e.g., temperature, pH, colour, particulate matter, odour or chemical content) which the wastewater must meet.

Did you know? *Some municipalities in Nova Scotia charge sewer surcharges as well as water use charges that together make up the water bill. If you pay a sewer surcharge as part of your billing, don't forget - when you conserve water in your business, the result is savings on both water use and the sewer surcharge!*

An increasing number of municipalities are applying sewer surcharges to residential water bills. While metering of water usage has been common for some time, the metering of the return flow to the sewer system, particularly as it relates to the industrial sector, is a more recent initiative by municipalities. Case studies show that including sewage treatment in rate calculations generates greater water savings.

To check regulations under the Protected Water Area, visit http://www.gov.ns.ca/just/regulations/

Did you know? *There are 82 municipal water treatment facilities in Nova Scotia that supply about 50% of the population with their water. The other 50% of us obtain drinking water from private wells.*

Did you know? *That once established and well mulched, many perennials are drought resistant. Drought resistant varieties for landscaping include coneflower, iris, daylily, verbena, dianthus, thyme, rosemary, lavender, spirea, potevilla, euonymus and many evergreen shrubs.*

What other Municipal restrictions may affect my business?
Through local zoning, municipalities may place restrictions on the type of practices that can be undertaken on some properties. In addition, businesses can contact their municipality to determine if the business is located in a watershed designated under the Environment Act as a Protected Water Area. Regulations under this designation may require the business to control certain aspects of its practices.

4.6 Checklists: Assessing Opportunities and Best Practices for Your Business

This section is a series of self-assessment checklists to help identify where water reduction opportunities may be present in a business. The checklists cover general information and equipment, process equipment and practices, kitchens, landscaping, outside systems and staff education. The checklists will help you to determine pollution prevention opportunities to increase efficiency and conserve water, but keep in mind that they are a starting point for your company. Watch for other opportunities that will be specific to your particular business.

A. Checklist – General

	Yes	No	Don't Know	Not Applicable
Can you read your water meter (bill) properly?				
Have you educated and involved employees in water conservation efforts?				
Are there strategically located signage reminding employees/customers to use water wisely?				
Are there signs reminding employees/customers to identify what is being poured into drains?				
Are there routine maintenance programs to check and replace worn parts, tanks, and connections before leaks can occur?				

B. Checklist – General Facilities and Equipment - Domestic Use				
	Yes	**No**	**Don't Know**	**Not Applicable**
Have you ensured that toilets and urinals don't leak?				
Have you installed ultra-low flow toilets?				
Have you adjusted flush valves or installed dams on existing toilets?				
Have you considered retrofitting urinals with water-conserving valves and timers/sensors that avoid automatic flushing during unoccupied periods?				
Have you installed faucet aerators and high-efficiency/low-flow showerheads?				
Does your equipment replacement program consider water usage as a factor for consideration?				
Are there signs posted to remind staff and customers to report leaks or drips (include contact information)?				

C. Checklist - Process Equipment and Practices				
	Yes	**No**	**Don't Know**	**Not Applicable**
Do you clean products, equipment, floors and the facility only when necessary?				
Are "dry clean-up" practices instead of hosing down, and first pass pre-cleaning conducted with squeegees, brushes, or brooms?				
Have you considered improved rinsing techniques such as counter current systems, sequential use from high quality to lower quality needs, conductivity flow controls, fog rinsing, or agitated rinsing?				
Are there high-pressure, low-volume nozzles on spray washers? *Replace high-volume hoses with high-pressure, low-volume cleaning systems and equip them all with spring loaded shut off nozzles.*				
Have you installed in-line strainers on all spray headers?				
Do you inspect nozzles regularly for clogging?				
Has blow-down/bleed-off control on boilers and cooling towers been optimized?				
Do you adjust overflows from recirculation systems by controlling the rate at which make-up water is added? *Install float-controlled valve on the make-up line, close filling line during operation, and provide surge tanks for each system to avoid overflow.*				

Is water cut-off when not in use by flow timers, limit switches instead of manually?				
Is the life of an aqueous bath being maximized via filtration and maintenance controls?				
Has once-through cooling water used in air conditioners, air compressors, vacuum pumps, etc. been eliminated with the use of chillers, cooling towers, or air-cooled equipment? *You can recycle or re-use water in another application, or replace with air-cooled equipment.*				
Can you identify all discharges that may be re-used? *Some additional discharges with potential for re-use are: final rinses, cooler flush water, filter backwash pasteurize and sterilize water, condensate, final rinses, boiler makeup, refrigeration and equipment cleaning.*				

D. Checklist – Kitchens				
	Yes	**No**	**Don't Know**	**Not Applicable**
Are you scraping rather than rinsing dishes before washing? *Handle waste material in a dry state wherever possible and install a filter for the sink to collect food scraps.*				
Do you wash full loads of dishes only, selecting the appropriate washing cycle?				
Do you turn off dishwashers when not in use?				
Are "electric eye" sensors for conveyor dishwashers installed?				
Have new water and energy efficient dishwashers been considered?				
Can water from steam tables be reused to wash down cooking areas?				
Do you use water-conserving icemakers? *Do not use running water to melt ice or frozen foods.*				

E. Checklist – Landscaping				
	Yes	**No**	**Don't Know**	**Not Applicable**
Is trickle/drip irrigation used?				
Have you optimized watering schedules and water placement? *Adjust for coverage (e.g., water the lawns, not the parking lot). Water during non-daylight hours and use rain barrels to collect water for landscaping purposes.*				

Do you use water efficient landscaping, e.g., using natural and drought tolerant plants, mulching beds reducing the amount of lawn area?				
Is there a preventable maintenance program in place for your irrigation system? *Repair all defective lines and sprinkler heads.*				

F. Checklist - Outside Systems

	Yes	No	Don't Know	Not Applicable
Is your storm drainage system well marked and maintained? *Design berms or grading to prevent run-off or rain water from flowing across areas where it could be contaminated. Monitor workers and subcontractors to ensure they are not polluting storm drains.*				
Are you using any methods to improve the quality of stormwater runoff from your site? *Leave undisturbed buffer strips around watercourses; ditches should be grassed; wetlands and properly designed ponds can improve water quality.*				
Do you sweep paved areas to clean? *Don't use water to clean sidewalks, driveways, loading docks, and parking lots.*				
Do you store waste materials inside? *If wastes need to be stored outside, ensure bins are protected from rain/weather. Cover dumpsters to keep water out of garbage, check for leaks and establish a "ground staining" inspection routine.*				
Do you keep dumpster areas and loading docks free from litter and contamination? *Regularly clean loading docks to remove spilled materials and leaked motor fluids, and install containment berms where liquids are stored or handled.*				
Do you clean equipment or vehicles in areas where washwater drains to a sediment trap or an oil-water separator? *Ensure washing takes place away from storm drains, streets, ditches and streams. Post signs at loading docks and washing areas describing proper behaviours. Wash vehicles less often. Consider steam and pressure wash systems.*				
If you have your vehicles washed off-site, do you use a commercial car wash that recycles water?				
Have you outfitted all hoses with automatic shutoff (pistol-style) nozzles?				

G. Checklist - Staff Participation				
	Yes	No	Don't Know	Not Applicable
Have you created a suggestion box and an incentive program to recognize employees that have water saving or cost saving ideas?				
Are there opportunities for incentive programs that invite staff participation? *Sponsor a slogan or a poster contest, and offer water-saving devices to employees for home use (which also is a low-cost alternative).*				
Have you posted bulletins on cost savings, incentives, or outstanding employee involvement? *You can also spread the message through internal memos, company newsletters, or inserts with pay stubs.*				

***Did you know?** Some manufacturers are now offering dual flush toilets. These innovative products offer two flushing modes – a full or half-flush (5.7 or 3 litres of water per flush). Compare this to the current industry standard of 13.2 litres per flush (a low-flow) and the 19 litres water per flush of models manufactured prior to the 1980's!*

In going through this checklist, did you identify some potential opportunities? Keep a record of the low-cost/no-cost practices in the Water and Wastewater Opportunities Action Table for follow-up. The Table is provided on the final page of this module. If you have identified options that are more complex or are potentially capital intensive, they will require additional in-depth investigation on your part. Use the Feasibility Assessment Checklist provided in Appendix B to help determine economic and technical feasibility, and potential environmental impact. Always remember that requirements legislated by municipal, provincial and federal authorities must be priorities and should not be assessed for feasibility.

Nova Scotia Success Story: Miller Composting Corporation, Dartmouth, NS
A "State of the Art" Composting Facility Minimizes its Water Use and its Wastewater

Miller Composting Corporation is a sister company of the Miller Group of Companies, an Ontario-based organization. Miller opened a state-of -the-art composting plant in Burnside Industrial Park in Dartmouth, NS in 1998. It is one of the largest composting plants in Canada, and considered by Miller Composting to be one of their showcase facilities. The Burnside facility has a special "closed-cycle" leachate processing system for composting upwards of 25,000 tonnes of organics annually. To maintain optimal break down conditions, water is added to the compost in the vessel at a rate of 36 litres per minute over an 8-hour period, to assist the breakdown of materials. The organic material and water mix, with some liquid seeping through the vessel as leachate. Miller collects and stores this leachate water for re-use. This leachate water is continuously re-circulated into the composting process to help to minimize the amount of water used in the operation and to avert treating and releasing liquid effluent into the sewer. No leachate water is discharged into the sewer with this system.

Miller experienced considerable cost savings in 1999 by reusing leachate water in the composting process. Miller purchased less water and the costs associated with treatment of leachate prior to discharge (chemicals, equipment and labor) were avoided since no leachate was discharged in the sewers.

To further minimize the use of water from the city supply, Miller collects rainwater through the bio-filter system and stores it for future use. This system is also designed to divert rainwater from the roof of the facility into the bio-filter system, if required.

Miller is a good community neighbour - They've been involved in a number of community projects. In 2000, they provided 61 cubic metres of high-grade compost to the North Dartmouth for a community garden. Fifteen cubic metres were donated to the Ecology Action Centre for fund-raising purposes. They have been involved in the Metro Food Bank's *Plant a Row* program. There is also a monitoring committee of local citizens and business owners in-place to respond to concerns and discuss any issues regarding the plant operations. Miller Composting Corporation was recognized by the Eco-Efficiency Centre for its liquid waste reduction in the 2000 Eco-Efficiency Centre Awards for Environmental Excellence.

For further information contact:
Miller Composting Corporation,
80 Gloria McCluskey Ave.
Dartmouth, NS B3B 2A4

4.7 Tools and Tips for Business: Publicizing Your Water Efficiency Efforts

Make sure that you are letting your customers, suppliers and the general public know about your conservation and efficiency efforts. A good water efficiency program is news because it means more water is available to the community. Here are some ideas on getting the word out about your initiatives:

- Display the company's water conservation results in public reception areas.

- Post signs on water-thrifty landscapes to identify types of plants that require little water.
- Publicity options could include company newsletters, brochures, trade publications, news releases to local media, and letters to your mayor, councillors, MLA or MP.
- Sponsor water conservation projects such as a public demonstration garden of water efficient plants.
- Sponsor water conservation projects in schools.

Do you know where rain/runoff goes when it hits/leaves your site? Water can become contaminated with oil, sediment, fertilizers, etc., when it is on your property. There are several techniques that can be used to improve the quality of surface water runoff (water quality ponds, infiltration ditches, etc.) and "Best Management Practices" that can reduce the likelihood of runoff becoming contaminated in the first place.

Initiatives for Greening Hotels - Fairmont Hotels and Resorts is a subsidiary of Canadian Pacific Limited, created a how-to guide for hotels that want to lessen their environmental impact and save money. The manual "The Green Partnership Guide: A Practical Guide to Greening Your Hotel" provides information on starting, maintaining and expanding an environmental program in your hotel. There's also information on motivating employees and generating positive media coverage. To purchase a copy of the manual, contact Fairmont Hotels & Resorts, Toronto,
416-874-2410, or e-mail lyle.thompson@fairmont.com, or the Tourism Industry Association of Nova Scotia (TIANS) at 1-800-948-4267.

Canadian Success Story: CXY Chemicals Ltd., Brandon, Manitoba
- A Closed Loop Wastewater System

CXY Chemicals Ltd. employs 44 employees and its main water use is for process water for the manufacture of chemicals. In 1986, the effluent line from the plant to the Assiniboine River was sealed. The waste stream was redirected to the brine system. After impurities are removed, the resulting water is reused in the manufacturing process.

Percent of water and wastewater saved was 100%. All raw water used in the former process was saved apart from the water used for drinking. All process wastewater was saved except for sanitary sewer water from toilets and sinks.

4.8 References and Resources

References

[1] Canadian Centre for Pollution Prevention. *"at the source"*, Winter/Spring Issue 2002. www.c2p2online.com/

[2] Environment Canada. Water Conservation – Every Drop Counts. http://www.ec.gc.ca/water/en/info/pubs/FS/e_FSA6.htm,

Interested in more success stories and case studies? Try the City of Portland's BEST and BIG Success Stories (www.water.ci.portland.or.us/BESTBIG.HTM) for these stories:

***Crown Cork and Seal**: A $12,000 investment saved about $46,000 in water and sewer billings in the year following installation. Water use was cut by 80 percent.*

***Elf Atochem North America**: Elf developed programs (including reuse of process water in cooling towers) to reduce water consumption by 303 million litres between 1992-93, nearly 20 percent of total use.*

***Graphic Sciences Inc.**: Paid for a cooling tower in six months with savings on water and sewer bills. The tower reduced water use by 81 percent.*

***Double Tree Inns** (formerly Red Lion Hotels): Retrofitted with efficient plumbing fixtures and established a conservation education program. Hotel retrofits saved 45 million litres per year (36 percent). The laundry project saved 22 million litres of water per year (an additional 30 percent).*

***Hercules, Inc.**: Reuses cooling water for boiler makeup and boiler condensate to wash trucks. These projects and others reduced annual water use by 515 million litres (67 percent) between 1992 and 1998.*

Resources

Nova Scotia Department of Environment and Labour publications/brochures
http://www.gov.ns.ca/enla/
- We all have a Part to Play
- Water Wisdom Fact Sheet
- A Drinking Water Strategy for Nova Scotia
- Before You Construct an On-site Sewage System
- Taking Care of Your Water Supply

Environment Canada publications/brochures
A Guide to Provincial Environmental Law in Nova Scotia. 2000. (Prepared by LJM Environmental Consulting for Environment Canada, Parks Canada – Atlantic Region)

Environment Canada has produced a series of general awareness Water fact sheets and Use Water Wisely brochures available. These include:
- A Water Efficiency Planning Guide for Building Owners and Managers http://www.ec.gc.ca/water/en/info/pubs/brochure/e_IWDWW9.htm
- Water Audit http://www.on.ec.gc.ca/water/greatlakes/data/water-wise-pamphlets/audit-e.html
- Water – No Time to Waste http://www.ec.gc.ca/water/en/info/pubs/nttw/e_nttwi.htm

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Try the Georgia Department of Natural Resources Pollution Prevention website (http://www.state.ga.us/dnr/p2ad/watereff.html) for these stories:

- *Water Efficiency - A Key Element of* ***Swissotel****'s Green Hotel Initiative*
- *Saved Water = Saved $$ at* ***Mount Vernon Mills***
- *Short- and Long-term Water Management Planning at* ***Southwire***
- ***Weyerhaeuser-Flint River Operations*** *Explores Methods to Reduce Water Usage*
- *Water Conservation in the Chemical Industry:* ***Advantis Technologies, Inc****.*
- *Water Efficiency Makes Good Business $ense at* ***Unilever*** *Home and Personal Care*
- *Saving Water at* ***Golden State Foods***

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Canadian Water and Wastewater Association: Water Efficiency Experiences Database. http://www.ec.gc.ca/water/index.htm

City of Portland Water Website. www.water.ci.portland.or

Georgia Department of Natural Resources Pollution Prevention Website. http://www.state.ga.us/dnr/p2ad/

Industry Canada - Eco-Efficiency Website. http://strategis.ic.gc.ca/SSG/1/ef00025e.html

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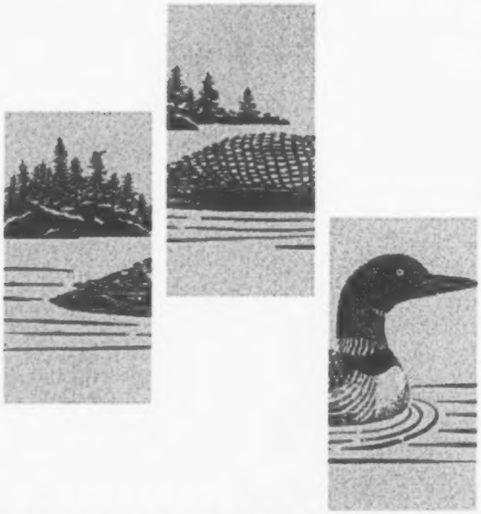
Water and Wastewater Pollution Prevention Opportunities Action Table					Module 4		
Pollution Prevention Practice or work tasks required to achieve a goal	**Responsible Individual**	**Efficiency or Reduction Goal**	**Resources Required**	**Start Date**	**Completion Date**	**Results (reduction or efficiency achieved)**	**Savings Achieved**
Example: *Check all hoses in plant for leaks*	*Jane Doe, Plant Manager*	*5% reduction in water used*	*Time (x# of hours)*	*June 1*	*June 15*		

Pollution Prevention Workbook for
Business in Nova Scotia

MODULE 5

Eliminating and Reducing Chemicals in Your Business



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NOVA SCOTIA
Environment and Labour

Introduction

Pollution and waste costs your business money and impacts the environment. By preventing pollution the environment is better protected and typically business liabilities are reduced, while productivity and competitiveness are enhanced.

Pollution Prevention (or P2 as it is sometimes called) is an approach that any size or type of organization can apply to both protect the environment and save money. In its simplest explanation, it is captured by the familiar saying, "an ounce of prevention is worth a pound of cure". If a company doesn't create pollution or waste, it doesn't have to devote time and resources to storing, handling, transporting, treating or disposing of it. Pollution prevention includes conserving water and energy, "green" purchasing, efficient use of raw materials, replacing hazardous products with less hazardous ones, and modifying processes to reduce waste and pollution.

This "Pollution Prevention Workbook for Business in Nova Scotia" has been designed to introduce small and medium-sized businesses to pollution prevention and assist them in making pollution prevention part of their day-to-day decision making - in effect, to help companies realize that pollution prevention efforts simply make "good business sense"!

The "Pollution Prevention Workbook for Business in Nova Scotia" contains seven modules and a directory of contacts. A business can use the entire workbook or can use individual modules one at a time. The series of modules include:

Introduction to Pollution Prevention
Getting Started with Pollution Prevention
Minimizing Risk in your Business: Pollution Prevention & Risk Management
Pollution Prevention, Water and Wastewater in your Business
Eliminating and Reducing Chemicals in your Business
Solid Waste Reduction and Resource Recovery in your Business
Efficient Energy Use in your Business

"Notice to User"

This manual is intended to provide information on the benefits of pollution prevention for businesses in Nova Scotia. It also provides information on some of the relevant laws in effect in Nova Scotia as of the date of publication. It is not intended to provide information on how to comply with all provisions of those laws which may apply to businesses.

This manual is not intended to contain a complete statement of the law in the area of pollution prevention or the environment. This manual does not replace reading the legislation and regulations. Amendments may be made to the legislation or regulations after the publication of this manual and reference should be made to the most recent official version of the legislation and regulations. Anyone needing specific advice on his/her own situation should seek advice from a lawyer or an environmental expert. Examples and interpretations given are not binding on the Crown.

Acknowledgments

The *Pollution Prevention Workbook for Business in Nova Scotia* was commissioned by Nova Scotia Environment and Labour and Environment Canada and authored by the Eco-Efficiency Centre.

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Nova Scotia Power Inc.
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Eco-Efficiency Centre
Nova Scotia Environment and Labour
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Alberta Department of Environment

A special thanks is extended to Pat O'Neal of Canada Bread Atlantic for taking the time to provide comments from a business employee perspective.

Our appreciation is extended to Environment Canada for their exceptional efforts in having this workbook produced. A special acknowledgement is also extended to the Canadian Centre for Pollution Prevention and to Dr. Robert Pojasek for their wealth of knowledge and their contributions to this document.

We encourage businesses to produce copies of the Workbook as a reference for their pollution prevention efforts and to educate employees. The content of the Workbook is not to be altered without permission from the sponsoring agencies. The Workbook is designed to be updated and amended on a periodic basis. Check the Nova Scotia Environment and Labour website (www.gov.ns.ca/enla) to determine if you have the most recent edition.

February 2003

Eliminating and Reducing Chemicals in Your Business

Module 5

This module includes:
- *Kick-Off Quiz*
- *Gathering Key Pieces of Information*
- *Primer: Understanding the Chemicals in Your Business*
- *Environmental Legislation*
- *Checklists: Assessing Opportunities and Best Practices for Your Business*
- *References and Resources*
- *Table - What Chemicals are your Business Using?*
- *Opportunities Action Table*
- *Success Stories and Case Studies (throughout)*

"...pollution prevention can provide the most cost-effective opportunities for reducing environmental and health risks while improving a business's bottom line" --Pollution Prevention Planning Handbook, CEPA 2001. [1]

5.1 Introduction

Whatever type of business your Nova Scotian company conducts, you probably use chemicals. You may sell some type of chemical product to customers, chemicals may be used in equipment, for shop clean-up, or in landscaping around your property. If you are a manufacturer, chances are you are using hazardous products in some parts of your production. Industries that are major users of chemicals include printing, metal finishing, photo finishing, battery manufacturers, dry cleaners, vehicle maintenance and repair, wood or furniture manufacturers, and industrial cleaners. But, a wide variety of other common businesses and organizations in our communities are also heavy users of chemicals including hair and beauty salons, and dental, veterinary and medical clinics.

In any business where chemicals are in use, there are environmental and human health concerns related to spills and accidents, occupational exposure, air emissions, water discharges and hazardous waste disposal. Chemicals can contaminate the soil, corrode plumbing, create toxic fumes, damage sewer systems and pollute water supplies. Reducing or eliminating chemicals in your business through pollution prevention can benefit your company by:
- Generating financial savings from reduced use of chemicals and decreased hazardous waste generation. If you don't have chemicals or discharges, you don't have to devote time and resources to storing, handling), transporting, treating, or disposing of them, or complying with relevant regulations
- Bringing you into compliance with federal government legislation (e.g. the Canadian Environmental Protection Act (CEPA 1999)), provincial legislation (e.g., Dangerous Goods Management and municipal legislation (e.g., sewer use bylaws).
- Developing a better public image, by eliminating/reducing the amount of chemicals used in your company. You may increase your market share by creating a public image of a company that cares about the environment and the health of your community.
- Creating a healthier workplace environment, by reducing the amount of chemicals to which you and your employees are exposed.
- Reducing risk and financial liability by minimizing the potential for spills and contamination.

By reducing your use of chemicals, you can also benefit the larger community by:
- Reducing pollution, protecting local watercourses and water supplies, and maintaining a healthy environment.
- Reducing costs for communities to repair and upgrade sewer systems.
- Reducing risks associated with transportation of chemicals.

Whatever your reason, eliminating and reducing the use of chemicals in your business is a smart decision and makes good business sense. By using a pollution prevention approach in your company, you can eliminate pollution and inefficiencies and become a better business.

This module, "Eliminating and Reducing Chemicals in Your Business", will provide your business with practical information, ideas, tools, and resources on how you can effectively reduce the use of chemicals in your company by focusing on preventing pollution as opposed to managing pollution after it has been created.

5.2 Kick-Off Quiz

Before starting this module, take our Kick-Off Quiz to see how your company currently rates in the awareness and management of chemicals and hazardous wastes. Scoring works as follows: no = 0 points, somewhat = 1 point, and yes = 2 points. Write your score in the blank provided at the end of each question.

1. Do you know what types of chemicals your company uses? *(If you don't know which chemicals you use, you can't adequately protect your workers, help firefighters identify the best means to control a fire at your facility, and develop procedures to prevent spills and releases of chemicals into the environment.)* ________
2. Are you familiar with the potential negative health and environmental impacts caused by chemicals your company uses? *(Some of the most common chemicals in everyday use by companies pose risks to human health and to the environment.)* ________
3. Are you aware of the current regulations and municipal by-laws concerning chemicals that apply to your operation? *(In many areas of Nova Scotia the use, storage and release of chemicals is regulated by all three levels of government (see section 5.5 for details).)* ________
4. As an employer, do you know what your responsibilities are if chemicals are used, stored or handled in your business? *(There are several key responsibilities for employers regarding chemical use that are clearly laid out in provincial environment and health and safety legislation.)* ________
5. Do you know how much your company is spending on managing chemicals and hazardous waste? *(By understanding the total costs including disposal, transporting, equipment, labour, insurance, compliance, legal services, employee training, etc., you can fully understand the economic benefits to reducing chemical use.)* ________

Total Score: ________

If you scored between 8-10, good work! Keep it up!
Between 4-7, you are not doing too badly but could likely improve and reduce your company's environmental impacts.
Between 0-3, you need help, but there's lots of assistance available. Read on!

5.3 Gathering Key Pieces of Information

There is some baseline information that will be useful to have on-hand as you work through the various modules of the Workbook. By compiling your company's data on chemical use, quantities purchased, and costs, you better understand your current performance and can identify possible problem areas, and areas for targeting pollution prevention efforts. Baseline data also provides a reference point for monitoring progress and savings, and allows you to compare your performance against industry standards. In this section of the module, record the key pieces of information. Some of this information may be readily available through purchasing and invoicing records, or from Material Safety Data Sheets (MSDS). Information may be available from previous surveys or audits. A facility walk-through and a discussion with key staff will uncover some of the information. You will need to estimate some figures. You probably have access to weekly and monthly information - by converting to annual figures, a better appreciation of the scale of current costs and inefficiencies can be gained, along with the savings that can be achieved.

Chemical Data

Where Chemicals Used	Amount Used (Annually)	Cost (Annually)	Types of Chemicals
- production			
- office			
- cleaning			
- landscaping			
- other			
Total Amount/Costs			
Wastes Generated *			Disposal Methods
- hazardous waste (solid or liquid)			
- wastewater effluent			
- air emissions			
- solid waste			
Total Wastes Generated			

*Include all chemical wastes such as spillage/leaks, and chemicals recycled

Nova Scotia Success Story: King Metal Fabricators, Dartmouth, NS

King Metal Fabricators (King) specializes in structural and ornamental metal products and prefabricated metal building components. It developed the first double wall tank system in North America specifically dedicated to the safe interim storage of used/waste oils and other hazardous waste petroleum products. Using the latest distillation technology, all cleaning solvents are captured and recycled in-house. The operation was using and disposing of approximately 23 litres of solvents per day at a cost of $90 to $100/day. These solvents typically cost $2.20/litre to purchase and $2.20/litre to dispose of. With the solvent capture and recycling system, the operation uses approximately 23 litres per day with 22 litres being returned from each day's use, resulting in a 95% reduction in the amount solvent purchased and disposed of as hazardous waste.

In addition, a self-contained, self-recycling blast booth was installed to clean products for finishing. Rather than sand, steel shot and grit are used as the blast medium and as a result, the use of sand and its byproducts from the blasting press have been eliminated. The shot and grit are automatically collected, cleaned and returned to the blast pot. The air is circulated through filter banks and returned to the blast room creating a completely self-contained operation with no negative impact on the environment. Shot can be used as much as 200 times where sand may get two uses. Typically what used to take 8 hours labour now can be done in less than 4 hours.

Environmental Benefits:

- A 95% reduction in the amount of solvents purchased and disposed of as hazardous waste. Less VOCs are released to the environment as 95% of the solvents are captured and recycled.
- An elimination of sand as a raw material and a waste from the blasting process.

Economic Benefits:

Capturing and recycling solvents - Savings of approximately $16,000/year.

- Approximately $12,000/year is saved on labour alone from the self-contained and self recycled blast booth.
- The total cost for environmental control (including energy conservation initiatives) was under $300,000. After three years of operation, hard cash savings are around $45,000 per year, which meets King Metal's expectations for return on these capital expenditures.

Social Benefits:

- Greener community due to reduction in plant emissions.
- Safer workplace for employees.

For more information contact:
King Metal Fabricators Ltd.
219 Waverley Road
Dartmouth, NS B2X 2C3

***Did you know?** The vast organic chemical industry is based on seven basic materials derived from petroleum and natural gas. These raw materials, which can be called the "seven building blocks" of organic industrial chemicals, are ethylene, propylene, butanes and butadiene, toluene, xylenes and methane. Thousands of chemical products are based on one or more of these building blocks.*

5.4 Primer: Understanding the Chemicals in Your Business

Chemicals play a vital role in industry. Chemicals can be found in solvents, paints, oils, alkalis, acids, a variety of industrial gases, and pigments. If you are a manufacturer, chemicals are likely being used in your process or as a constituent of raw materials. Many industrial process chemicals include metals such as aluminum, chromium, copper, lead, nickel, cadmium, and mercury.

Many chemicals are toxic to human health or the environment. Responsible chemical use and handling is required to avoid adverse environmental and human health effects.

Chemicals can be categorized in a number of ways. This section outlines some of the general categories of chemicals that are frequently used in industry, along with examples of their toxic effects. Table 5-1 is a general summary of industrial activities and some of the chemicals that may be associated with them.

Solvents and Volatile Organic Compounds (VOCs)

Does your business use cleaning products, adhesives, glues, paints, varnishes, disinfectants, dry-cleaning products, inks or dyes? How about chemicals such as acetone, benzene, toluene, alcohols (methanol, ethanol, isopropanol), kerosene, mineral spirits, naphtha, or white spirits? If you answered yes to any of these questions, solvents and VOCs may be a concern for you.

***Did you know?** In 2000, according to the National Pollutant Inventory Release Program, over 32,000 tonnes of toxic substances were released to Canada's environment, including 8900 tonnes of carcinogens.*[2]

Solvents are commonly used to remove material from a surface (e.g., to dissolve grease) or to carry a solution of fine particles (e.g., in paint). Although water is the most common solvent, many commercial activities require a material that is more aggressive or can dissolve substances that are insoluble in water. Organic solvents, (i.e. containing carbon and hydrogen) and chlorinated organic solvents (i.e. also contains chlorine) fill this role for many processes. Organic solvents are used in industries such as printing and packaging, chemical manufacturing, vehicle repair and maintenance, industrial and commercial cleaning, metal fabricating, welding and paint shops. This diverse group of products can be hazardous to both human health and the environment. Exposure to fumes and/or skin contact may damage skin and lung tissue, and affect the brain and nervous system.

Volatile organic compounds (VOCs) are substances that can evaporate (i.e. become a gas) at room temperature. Gasoline and other fuels are common sources of VOCs but cleansers, paints, inks and glues, including formaldehyde resins in plywood and carpets also produce VOCs. VOCs in indoor air can cause health effects ranging from irritation and nausea to lung and brain damage.

Outside, VOCs can react with sunlight and nitrogen oxide to create ground-level ozone or smog. Smog can be a powerful and irritating pollutant. Some VOCs are also ozone depleting substances that contribute to damaging the stratospheric ozone layer that protects the earth from harmful solar radiation.

What are the top industrial chemical releases in Nova Scotia? *Based on the companies reporting through the National Pollution Release Inventory (NPRI), our top 10 total environmental releases are: hydrochloric acid, sulfuric acid, zinc compounds, manganese compounds, hydrogen sulfide, isopropyl alcohol, methanol, ammonia, ethylene glycol, and lead compounds.*

Fuel Oil and Petroleum Products

Do you use fuel oil or petroleum based products in your operation? These may include gas, diesel oil, kerosene, naphtha, lubricating oil, fuel oil, engine oil, hydraulic fluid and any waste oil. If you do (and almost everyone does), you should be aware of regulatory requirements, and have in place, practices and procedures that minimize loss of these products. As mentioned, gasoline and other fuels are common sources of VOCs, pollutants which can cause health and environmental effects. There are liabilities associated with spills of these products. Lastly, there are many safety issues associated with petroleum products.

Pesticides and Industrial Chemicals - Persistent Organic Pollutants (POPs)

Does your business use or handle pesticides (e.g., insecticides, fungicides, herbicides or rat poison)? Or, are you in an industry such as pulp and paper, or plastic manufacturing that is using organic chemicals --- particularly those containing chlorine? If you answered yes to one of these questions, POPs may be a concern for your company.

Persistent Organic Pollutants (POPs) are a special group of organic chemical compounds and mixtures that have been recognized internationally as a danger to human health and the environment. These substances have the following properties:

- They are semi-volatile (i.e. they will evaporate but usually slowly).
- They have low solubility in water but are very soluble in fats or oils (i.e. they will dissolve in animal and human tissues).
- They are persistent (i.e. they are not easily broken down by heat, light or biological processes). Colder regions like Canada's Arctic become global sinks for these materials.
- They bioaccumulate (i.e. organisms that contact them build up higher concentrations over time) and may biomagnify (i.e. concentrations get higher as they move up the food chain).
- They cause problems with human health and the environment. Damage can range from interfering with reproduction to birth and development abnormalities or, in higher doses, to reduced lifespan or death.

Of the many POPs that are found in our environment, twelve of the most persistent, bioaccumulative chemicals have been identified for immediate action. Canada has signed and ratified the Stockholm Convention - a United Nations Environmental Programme (UNEP) global agreement that will reduce or eliminate emissions of these twelve substances.

There are three basic groups of POPs - industrial chemical products like Tributlytin (TBT), methyl mercury, hexachlorobenzene and polychlorinated biphenyls (PCBs), pesticides like DEET, Chlordane, Dicamba, DDT, and by-products from industrial processes, like dioxins and furins. The only POPs that are likely to be of immediate concern to your company are PCBs, dioxins and furans, all of which are subject to controls from federal and provincial governments. However, other chemicals that your company uses may be POPs and may eventually be regulated so it is best to eliminate POPs whenever possible.

Did you know? *When mercury is emitted into the atmosphere, it can wash out into water bodies. Here, mercury is transformed by bacteria into methyl mercury, a common water pollutant. Methyl mercury is then taken up by aquatic plants, invertebrate animals, and vertebrate animals. In this way, methyl mercury moves up the food chain as a POP pollutant. Ninety-five percent of human exposure to mercury results from eating contaminated fish. Many states and provinces, including Nova Scotia, have fishing advisories warning people about eating freshwater fish due to mercury contamination.*

Metals

Do you use products in your company that contain mercury, lead, zinc, cadmium, nickel, selenium, copper, cobalt, arsenic, or silver? Then metals may be a concern for your company.

Metals are naturally occurring substances in the environment. Once the ores are mined, smelted and refined, they are used in industrial processes such as electroplating and the manufacturing of metal products. In addition, metals are found in many other industrial products. For example, mercury is found in many common products in use in our businesses like batteries, thermometers, thermostats, switches, lamps, paints, inks and disinfectants. Cadmium has specific uses in paint, photography, and batteries. Chromium is used in metal alloys and pigments for paints, cement, paper, rubber, and other materials. A major use of inorganic lead in Nova Scotia is in the manufacture of storage batteries. Lead can also be found in industrial paints (e.g., red lead oxide primer) or for use in assaying, soldering, radiator repair and metal reclaiming. Lead compounds are also used in jewelry making, stained glass making and in ceramic glazes. Metals can be released as wastes in the form of air emissions, acid rain, wastewater, discarded metal products, sewage discharges and urban run-off.

Lead, cadmium and mercury are three metals that are particularly toxic to humans, animals and plants. Health impacts of these metals include damage to kidneys, the nervous system of developing fetuses and children, and high blood pressure. But, high amounts of other metals such as nickel, selenium, copper, cobalt, and arsenic can also be harmful.

There is provincial legislation that regulates the sale, handling, use and release of ozone-depleting substances. See section 5.5 of this module.

Chlorofluorocarbons (CFCs) and other Ozone Depleting Substances (ODS)

If you use refrigeration, air conditioning, or dry cleaning equipment, industrial solvents, or are in the fire protection systems business, or even some food processing industries, you may be quite familiar with concerns around ozone depleting substances (ODSs). ODSs include chlorofluorocarbons (CFCs), hydrofluorocarbons (HCFCs), halons, methyl bromide, carbon tetrachloride, and methyl chloroform. When these industrial chemicals are released into the atmosphere they accumulate in the stratosphere (upper atmosphere) and cause an eroding of the ozone layer. This allows more ultraviolet radiation to reach the earth where it can harm plant and animal life. CFCs - compounds that contain carbon, chlorine and fluorine - have been used as coolants in refrigerators, air conditioners, pressurized spray cans and in fire-fighting equipment. Halons, compounds consisting of bromine, fluorine and carbon, are used as fire extinguishing agents, both in built-in systems and in handheld portable fire extinguishers. Methyl chloroform is used as an industrial solvent. HCFCs, are used as replacements for CFCs, but also deplete the ozone layer to a lesser extent.

Did you know? *In dollar terms, CFCs have become second only to narcotics as the biggest smuggling problem at some U.S. entry points since the United Nations ban on manufacturing CFCs in industrialized countries.*[3]

Looking for substitutes for HCFCs? *A list of alternatives for ozone-depleting substances can be found on the Environment Canada web site at www.ec.gc.ca/ozone/altlist.htm). The US EPA website also has a list of potential substitutes for HCFCs at (www.epa.gov/ozone/title6/snap/lists/index.html)*

The Montreal Protocol is an international agreement signed by 165 countries to control the production and exchange of certain ODSs substances. Canada is a signatory to this agreement and many of these chemicals are now banned or restricted in our country. Since 1996, CFCs and halons have not been produced or imported to Canada, and the use of carbon tetrachloride which was widely used as a raw material in many industrial uses, including the production of CFCs and as a solvent, is now restricted. All the provinces now require recycling/recovery of CFCs and hydrofluorocarbons (HCFCs). HCFCs and perfluorocarbons (PFCs) are classes of chemicals that have been used to replace CFCs. PFCs are compounds consisting of carbon and fluorine that do not deplete the ozone. However, both HCFCs and PFCs have high global warming potentials and regulations to restrict the use of these are being enacted. Air conditioning, refrigeration and fire suppression systems still contain large quantities of ODSs.

Did you know? *The Tar Ponds in Sydney, Nova Scotia is one of the largest deposits of PAHs in Canada. High concentrations of PAHs have also been found in harbours across the Maritimes such as in Halifax, Sydney, and Saint John.*

Other Toxic Substances to Watch for

Polycyclic Aromatic Hydrocarbons (PAHs) are pollutants found in smoke, soot, and exhaust resulting from the incomplete combustion of carbon compounds. Examples of industrial PAH sources are coal and oil-fired power plants, coke and asphalt production, waste incinerators, wood preservation, carbon black production, and aluminum smelting. Creosote-treated lumber, used in railway ties, utility poles, bridges and wharves, can also leach PAHs into the soil and aquatic environments.

Identifying What Chemicals You May Be Using in Your Business
Now that you understand what some of the chemicals in your business could be, how do you identify what you actually have in use? By talking to your employees, your suppliers and examining your products. Use Table 5-1, at the end of this module, as a general guide of chemicals commonly used for specific industrial activities.

The Nova Scotia Department of Environment and Labour has the following Information Sheets - "Chemicals in the Workplace" and "WHMIS and Retail Stores". (http://www.gov.ns.ca/enla/ohs/publicat.htm)

Workplace Hazardous Materials Information System (WHMIS) is a system of supplying information on chemicals used in the workplace. Every hazardous material ("controlled product" is the legal term used in Nova Scotia's regulations) in your business should be appropriately labeled and have a Material Safety Data Sheets (MSDS) available for it. Make sure that when you purchase a product that the supplier provides the appropriate WHMIS information and that products are properly labeled. You and your employees should be able to pick up a product and read the label, and go to the MSDS provided by the supplier, for information on the ingredients, hazards, health effects and symptoms, control measures, waste disposal and safe handling information. In fact, this is the law in Nova Scotia!

For a list of chemical classifications and substances, refer to the regulations on the Nova Scotia government website at http://www.gov.ns.ca/just

Some substances not covered under WHMIS (consumer products, explosives, cosmetics, and drugs). They do not need MSDS or supplier labels, however, they do need workplace labels and require employee training. A separate requirement of the Nova Scotia Occupational Health and Safety Act covers all potentially hazardous chemicals; even those exempted by WHMIS. This requires employers to "prepare a list of all chemical substances regularly used, handled, produced or otherwise present at the workplace that may be a hazard to the health or safety of the employees or that are suspected by the employees of being such a hazard ..."

***Tip**: Don't forget to share your chemical inventory list with local fire departments to enable them to effectively and safely respond to a fire at your business.*

According to provincial legislation, as an employer, if chemicals are used, stored or handled in your workplace, you must:

- Prepare a list of all the chemicals at the workplace. The list must include the common name and trade name of the chemical, its chemical composition and the name and address of the supplier and manufacturer.
- Ensure that MSDS are available to workers who may come into contact with WHMIS controlled chemicals.
- Ensure that current copies (i.e., less than three years old) of MSDS are available for all controlled products used in your business.
- Make sure that chemicals in the workplace are properly labeled. Suppliers are required to provide detailed labels with controlled products, but it is the employer's responsibility to ensure that such labels are in place. The employer must also ensure workplace

labels are on any decanted containers.
- Provide training for workers who are required to work with or near chemicals. An employee "works with a controlled product" if they store, handle, use or dispose of it, or if they supervise anyone who performs these functions.

What about "over-the counter", "brand name" products? How can I tell if they're harmful if they don't come with MSDS sheets?
Many small businesses purchase products like cleaners, lawn care products and paints at the local hardware store, grocery store or garden centre. This may create the impression that these products are less hazardous. However, many of the components of these products are quite toxic and their use is regulated in larger quantities (e.g. chlorine bleach). All-purpose cleaners may contain many different kinds of ingredients, such as detergents, grease-cutting agents, solvents, and disinfectants (chemicals such as ammonia, ethylene glycol monobutyl acetate, sodium hypochlorite and trisodium phosphate). Antibacterial cleaners usually contain antimicrobial pesticides - commonly quaternary ammonium or phenolic chemicals. Likewise toilet bowl cleaners have antimicrobial pesticides - things like sodium hypochlorite or bleach. They may also contain chemicals like hydrochloric acid. The pesticide chemicals found in mold and mildew removers are chlorine and alkyl ammonium chlorides and can be very caustic.

Since you don't have MSDS for these products, the label is your guide to identifying what chemicals you are dealing with, so always read the label first.

"The goal of the renewed CEPA is to contribute to sustainable development through pollution prevention and to protect the environment, human life, and health from risks associated with toxic substances.... It acknowledges for the first time the need to virtually eliminate the most persistent toxic substances that remain in the environment for extended periods of time before breaking down, and bioaccumulative toxic substances that accumulate within living organisms."[4]

From: Environment Canada's website: www3.ec.gc.ca/EnviroRegs/ENG/SearchDetail.cfm?intAct=1001

Some tips:
- Labels use signal words like "caution", "warning" and "danger" to show how toxic or hazardous a product can be.
- Watch for "chlor" on labels - that means it contains chlorine which is quite toxic.
- Watch for common chemical names such as petroleum distillates, aromatic hydrocarbons, mineral spirits, benzene, toluene, and xylene to alert you.
- Contact the manufacturer: they should be able to provide you with MSDS.
- Don't forget – these products require workplace labels and employees must be trained to use the products appropriately.

5.5 Environmental Legislation

All three levels of government have a hand in regulating the use of chemicals, including hazardous wastes.

Federal Regulations

Federal requirements on the use of hazardous and toxic materials have been defined by the federal government in the Canadian Environmental Protection Act, 1999 (CEPA). As mentioned in Module Four, other federal agencies such as Transport Canada and Fisheries and Oceans Canada also regulate certain issues with their legislation (e.g., Transport of Dangerous Goods Act, 2002, Fisheries Act, 1985).

To check whether a chemical is on the CEPA List of Toxic Substance, visit the CEPA Environmental Registry at http://www.ec.gc.ca/CEPARegistry

As well, WHMIS is supported by:

- Hazardous Products Act, 1985
- Workplace Hazardous Materials Information System Regulations

The Canadian Environmental Protection Act, 1999, (CEPA 1999), Pollution Prevention and Industry

CEPA was amended by the Government of Canada in 1999. The purpose of the new Act is to protect the environment and human health through the management of toxic substances and pollution prevention. Pollution prevention is given prominence in the Act as a preferred approach to environmental protection.

To view the CEPA regulations, visit http://www.ec.gc.ca/CEPARegistry/regulations/

Pollution Prevention Planning

Under CEPA, the Minister of the Environment has the authority to require an organization to prepare and implement a pollution prevention plan for CEPA-toxic substances (the List of Toxic Substances is found in Appendix D of the Workbook). Module Two of this Workbook provides an overview of pollution prevention planning. A guide to pollution prevention planning has been developed by Environment Canada and is available on their web page, along with a number of other pollution prevention fact sheets and documents (see the References and Resources section of Module Two for details)

For information on the Canada Gazette, go to http://canada.gc.ca/gazette/gazette_e.html

How does CEPA affect my business?

If your business is using, producing or releasing CEPA-toxic substances, you may be required to prepare and implement a pollution prevention plan in the future. However, in addition to legislation about pollution prevention plans, CEPA contains over 40 regulations and amendments dealing with the management of toxic substances. Your business needs to be aware of any of these regulations that apply to toxic chemicals and toxic wastes. Some of the regulations to consider include:

- Chlorobiphenyls (PCB) Regulations
- Storage of PCB Material Regulation
- Export and Import of Hazardous Waste Regulation
- Federal Halocarbon Regulations
- New Substances Notification Regulations
- Ozone Depleting Substances Regulations

To review regulations in the Fisheries Act regarding the release of deleterious substances, visit http://laws.justice.gc.ca/en/F-14/text.html

How will I know if my company needs to complete a Pollution Prevention Plan?

There are a number of ways you may find out. Once a substance has been added to the CEPA List of Toxic Substances and pollution prevention planning has been identified as a requirement, Environment Canada must publish the information in the *Canada Gazette*. (The *Canada Gazette* is the official newspaper of the Government of Canada). Industry sectors or individual facilities may be named specifically in the *Gazette*. Environment Canada may also mail notices to industry associations or directly to businesses that will be required to prepare plans. Information is also posted on the CEPA Environmental Registry.

To identify if your company should be reporting through the NPRI and for more information, visit http://www.ec.gc.ca/pdb/npri.

The publication entitled: A Citizen's Guide to the National Pollutant Release Inventory (2000) published by the Canadian Institute for Environmental Law and Policy is also helpful. Contact the Institute at (416) 923-3529 or cielap@cielap.org for more information.

Besides CEPA, two of the other main environmental statutes at the federal level are the Transportation of Dangerous Goods Act which regulates the transportation of hazardous substances across provincial boundaries, and the Fisheries Act which includes regulations that apply to the oil refining, metal mining, potato processing, meat and poultry, chlor-alkali, and pulp and paper industrial sectors. As well, the general provisions of the Fisheries Act prohibit the deposition of deleterious substances into waters frequented by fish.

The National Pollutant Release Inventory (NPRI)

A federal program, the NPRI requires companies using certain chemicals to report annually on pollutants they release into the environment. This includes emissions into the air and/or water, shipping of waste off-site, burying of waste into landfills, recycling, treatment, and disposal. The primary goal of the NPRI is to make information on pollutants available and accessible to citizens so they are informed and aware about contaminants in their area, and how they may be affected by this pollution.

Under the Nova Scotia Environment Act it is an offence to release a substance into the environment that may cause a significant adverse effect (impairing or damaging the environment).

Businesses must report to the NPRI if they meet minimum production and release thresholds. Contaminants requiring NPRI reporting are the fifty-five listed in Schedule One of CEPA as well as additional substances that have been added to the NPRI list. Today, there are a total of 268 substances that have to be reported according to NPRI criteria.

If you want copies of provincial regulations, they are available from the Government of Nova Scotia Website at http://www.gov.ns.ca/just

Provincial Regulations

The Nova Scotia Department of Environment and Labour regulates the use, handling, storage, and disposal of chemicals (referred to as dangerous goods) under several regulations. Businesses using chemicals must become familiar with the regulatory requirements. This Workbook does not provide information on how to comply with all of the provisions of the Environment Act and regulations that may apply to your business.

How do I know if my company uses chemicals legislated by the Province of Nova Scotia?
The Dangerous Goods Management Regulations legislate the general management of dangerous goods and hazardous wastes in Nova Scotia, and includes corrosive and poisonous substances, explosives, flammable substance, radioactive materials, and compressed gases.

What other provincial legislation applies to businesses handling, using, or storing chemicals or dangerous goods?
In addition to the Dangerous Goods Management Regulations, the following regulations address specific chemicals or dangerous goods:

- Petroleum Management Regulations - This covers handling, use and storage of petroleum products.
- Used Oil Regulations - These regulations cover the handling, use and storage of used oil.
- Solid Waste-Resource Management Regulations - These regulations include management and disposal of hazardous waste products such as paints, ethylene glycol, and batteries.
- Air Quality and Ozone Layer Protection Regulations - These two regulations address air quality issues.
- Nova Scotia Dangerous Goods Transportation Act - This Act is administered by Service Nova Scotia and Municipal Affairs and specifically addresses the movement of dangerous goods on public highways in the province.

There are many activities and types of businesses that require an approval from the Nova Scotia Department of Environment and Labour. Modifications to a designated activity also require an approval. For information on approvals, contact your local Department of Environment and Labour office (see Module Eight for contacts) or visit the website at http://www.gov.ns.ca/just.

Depending on the type of work that your business does, the following regulations may also apply:

- Asbestos Waste Management Regulations - Regulates handling and disposal of asbestos waste.
- PCB Management Regulations - Regulates handling and storage of PCBs and PCB waste.
- Pesticide Regulations - Regulates the sale, handling, use, storage, transportation and disposal of pest control products in Nova Scotia.
- Activities Designation Regulations - An approval is required for these designated activities.

If you want to obtain copies of bylaws that may affect your business, contact your local municipal office. This contact information is found in Module Eight.

If you need specific guidance concerning chemicals, contact your local Department of Environment and Labour office (see Module Eight) and refer to the regulations listed in this module.

Municipal Regulations
Many municipalities enact bylaws that cover specific activities within the municipal unit. Municipalities may regulate the following activities that can have an impact on the environment:

- Sewer Use (including drain disposal of liquid effluent and chemicals)
- Water Use
- Land Use (including the storage of dangerous goods)
- Pesticide Use

- Solid Waste Disposal (including the disposal of waste dangerous goods)

Looking to the Future

More initiatives to control chemical releases into the environment can be anticipated in the form of legislative and enforcement tools at all levels of government. Additional substances will be targeted for virtual elimination. Other chemicals will be strictly controlled and managed through using various tools. For example, there are new proposed federal regulations applicable to the dry cleaning sector, controlling the use and release of tetrachloroethylene (PERC), and possible regulations respecting the use of tetrachloroethylene and trichloroethylene as degreasers. As well, the Canadian Council of the Ministers of Environment (CCME) has identified mercury as a pollutant that warrants control and reduced impact on the environment. In July 2000, they released a Canada Wide Standard (CWS) which affects dental clinics. A 95% reduction in mercury amalgam releases is anticipated by 2005. Businesses have an opportunity to get ahead of pending regulations, or avoid them altogether by reducing or eliminating the use of toxic chemicals.

Nova Scotia Success Story: The Cape Breton District Health Authority, Cape Breton, NS

In June 2000, the Cape Breton Healthcare Complex entered into a memorandum of understanding with the Nova Scotia Department of the Environment and Labour's pollution prevention program. A pollution prevention plan was designed to reduce the impact of the Complex's facilities on the environment including: reduction in energy and water use, reduction of air emissions, reduction in mercury, and improved waste management and procurement procedures.

Mercury containment and abatement was considered a high priority at the Complex. A "bulb eater" was used to break up the lights and allow the mercury to be recovered in a filter and properly disposed of. Mercury clean up kits were purchased and spill clean up procedures were developed for use in the event of a spill. Any newly purchased blood pressure equipment and thermometers cannot contain mercury.

The use of gluderaldehyde (a sterilization agent) was discontinued and replaced with a less hazardous product. In the laboratory department, special kits are now being purchased which contain only the required amount of chemical for use. A major recycling program was implemented which diverted 50% of the solid waste from the incinerator. All batteries used in the facilities are diverted from the local incinerator.

Environmental Benefits:

Over the past several years, the conversion of mercury blood pressure units, thermometers and light bulbs has eliminated the use of 4,500 grams of mercury. The laboratory department has reduced the amount of chemical use by 50%. The Complex diverts about 3,000 pounds per month of solid waste from the incinerator.

Economic Benefits:
Reduced environmental liability through addressing mercury containment and abatement. Reduced cost associated with less hazardous waste generation--offset by the increased cost of confidential paper shredding. With the new type of lighting, a 20% reduction in energy use was achieved.

Social Benefits:
The discontinued use of gluderaldehyde has proven to be beneficial for the health and safety of the staff. The use of mercury clean up kits has made staff more aware of the hazards of exposed mercury and how to clean up mercury spills in a manner that is safe.

Adapted From the Canadian Pollution Prevention Information Clearinghouse
(http:// www.ec.gc.cca/pp/en/storyOutput.cfm?storyID=76)

5.6 Checklists: Assessing Opportunities and Best Practices for Your Business

Now that the various chemicals have been introduced, it is time to look at pollution prevention as it relates to chemicals. Module 2 of this Workbook introduced you to the basics of pollution prevention. As you recall, the aim of pollution prevention is to *prevent* the generation of pollution rather than treating it after it has been generated, or in other words, to reduce pollution at its source (source reduction). Source reduction techniques are often relatively no-or-low technology and cost approaches. Methods of source reduction of toxic substances used in industry include:

- Improving the storage, handling, and distribution of chemical products to reduce losses.
- The substitution of chemicals such as elemental chlorine with those that are less harmful (such as hydrogen peroxide and chlorine peroxide).
- Modifying or making changes in processes used by the company for ones that use less chemicals and/or generate less waste dangerous goods.

The following checklists provide ways in which you can eliminate and/or reduce the use of chemicals in your company through good housekeeping, chemical substitution and product changes, technology and equipment changes, in-process recycling and employee awareness. The checklists will help you to determine some pollution prevention opportunities, but keep in mind that they are a starting point for your company. Watch for other opportunities that will be specific to your particular business.

A. Checklist - Good Housekeeping				
	Yes	**No**	**Don't Know**	**Not Applicable**
Are spill prevention and cleanup procedures in place that reduce the amount of chemicals entering the environment?				
Is inventory monitored to reduce accumulation of date-expired (old) products?				
Is old stock used up before new stock is purchased?				
Are unused and outdated materials returned to their supplier?				
Are there frequent inspections of chemicals in storage?				
Are chemicals stored in a manner to allow easy visual inspection?				
Is leak detection equipment installed?				
Are dangerous goods and waste dangerous goods stored in an area that is protected from vehicle collision?				
Are hazardous materials clearly dated and labeled so they can be easily identified?				
Are storage areas protected from the elements?				
Are drip pans used when pouring chemicals?				
Do you maintain a history of spills and regularly review to identify spill prevention opportunities?				
Are solvents covered when not in use to reduce VOC releases?				
Are leaks and other malfunctions repaired immediately?				

B. Checklist - Chemical Substitution and Product Changes				
	Yes	No	Don't Know	Not Applicable
Are soap or detergent solutions used instead of solvents wherever possible?				
Are water based cleaners used instead of solvents for general cleanup?				
Do you select biodegradable detergents and cleaners?				
Are multipurpose solvents that are low in VOCs used instead of high VOC solvents? *Many commercial products identify VOC content - look at the MSDS to identify VOC content.*				
Where possible, do you select a single multi-use product instead of a number of specialized ones (e.g., all purpose cleaners, multi-use solvents, etc)?				
Have you eliminated the use of hazardous metal pigments by purchasing raw materials free from trace quantities of toxic impurities? *Talk to your suppliers and read your MSDS for this information.*				
Do you and your staff select products that are less harmful to the environment (e.g., citrus-based cleaners, soy or plant-based lubricants, etc)? *Check with equipment manufacturers before using new lubricants or solvents.*				
Do you purchase water-based products (e.g., latex paints)?				

C. Checklist - Cleaners and Solvent Use

	Yes	No	Don't Know	Not Applicable
Are high-pressure sprays, steam or hot water cleaners used as an alternative to solvent cleaners?				
Do you have procedures in place to reduce drag-out losses (e.g., drip pans, wipers, etc)?				
Are dry cleaning processes used to reduce the amount of solvent needed for cleaning such as surface treatment with wire brushes, wiping with a reusable rag, or soaking in dirty solvent to reduce the need for clean solvent?				
Can ultrasonic or mechanical agitators be used for metal parts cleaning?				
Are sludge and solids routinely removed from solvent tanks/sinks to prolong life of solvent?				

D. Checklist - Waste Dangerous Goods

	Yes	No	Don't Know	Not Applicable
Are signs posted to remind staff not to dispose of chemicals by pouring or washing them down the sink or floor drains?				
When vehicle or equipment fluids are drained to service a part, are the fluids stored in a clean container so that they can be used to refill the part?				
Are waste chemicals and fluids separated for disposal/recycling? *Many fluids and chemicals can be recycled or reused if they are not contaminated with incompatible materials. If incompatible materials are mixed they may have to be dealt with as a waste dangerous good resulting in higher disposal costs.*				
Is used oil collected for recycling as per provincial regulations?				

E. Checklist - In-Process Recycling				
	Yes	**No**	**Don't Know**	**Not Applicable**
Is an in-house solvent recovery and treatment program being used in your facility?				

F. Checklist - Training and Employee Education				
	Yes	**No**	**Don't Know**	**Not Applicable**
Have you developed a formal, written policy statement that presents your pollution prevention plan clearly to employees?				
Do you involve, educate, and inform employees about your pollution prevention plan?				
Have you recognized employees' accomplishments and motivated them through incentives?				
Do you publicize your pollution prevention successes to staff?				

In going through this checklist, did you identify some potential opportunities? Keep a record of the low-cost/no-cost practices in the Chemical Opportunities Action Table for follow-up. The Table is provided on the final page of this module. If you have identified options that are more complex or require potentially capital intensive, they will require additional in-depth investigation on your part. Use the Feasibility Assessment Checklist provided in Appendix B to help determine economic and technical feasibility, and potential environmental impact. Always remember that requirements legislated by municipal, provincial and federal authorities must be priorities and should not be assessed for feasibility.

Nova Scotia Success Story: Argo Protective Coating Inc., Dartmouth, NS

Argo Protective Coatings Inc. is an ISO 9002 certified company that is involved in the application of protective coatings such as hot dipped galvanizing, metalizing/thermal spraying, blasting and painting various steel structures. They have a total of 60 employees at their two locations--in Burnside and Woodside in Dartmouth, Nova Scotia. As a provider of metal finishing services, Argo is part of an industry that traditionally has many serious environmental issues that include generating hazardous wastes, and using large quantities of water and energy. Succeeding in this sector also requires a greater awareness of environmental regulations, potential problem areas and opportunities to make environmental and economic improvements. Argo has been reviewing their operations to ensure that they are complying with regulations and operating efficiently. They are also always watching for new opportunities to gain a competitive edge. Their efforts have recently reaped significant environmental gains in several areas, and economic gains for the company!

Methyl ethyl ketone (MEK) is a commonly used chemical in many industries, including metal finishing. Argo uses it as a cleaner in their coating process, but because of its potential risk to the environment, it was managed by being recycled through the supplier. Argo felt there was a more cost-effective and environmentally responsible alternative, so they purchased their own MEK Solvent Recycler unit. The waste MEK is being distilled on-site and the company is recovering high quality (95% plus) MEK for re-use. An average daily recovery of 45 litres of product had reduced operating costs by $80 per day--a drop of over $20,000 per year if the unit operates at normal capacity. Purchased for $6000, the unit has a payback period of much less than a year.

In addition, Argo has negotiated a mutually beneficial agreement with a local salvage company that involved their waste paint containers and zinc ash by-products. All of the company's zinc ash by-products are sold to one salvage company that hauls and sorts the product for resale to companies that reclaim the product for use in other areas of manufacturing. In return, the salvage company supplies a collection container and regularly picks up Argo's waste paint containers for recycling. The costs associated with sending the containers to landfill are eliminated, the containers recycled, and the zinc by-products are reclaimed.

Argo is convinced that "it pays to be green". While lessening the impact of their facilities on the environment, the company is also enjoying reduced operating costs, safer workplaces for their employees, and improved relationships with municipal and provincial regulators as they try to go beyond compliance. Argo will continue to strive to implement new environmentally and economically feasible processes into their operations. By reducing, reusing, and recycling, they are working to look after tomorrow, today.

For further information contact:
Argo Protective Coatings Inc.
160 Joseph Zatzman Drive
Dartmouth, N.S. B3B 1P1

5.7 References And Resources

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Resources

Guides/Checklists/Fact Sheets/Publications
Environment Canada, Federal Programs Divisions, Pollution Prevention Program.

- Fact Sheet on Hazardous Waste Minimization: Reducing Waste at the Source (Fact Sheet #3)

- Fact Sheet on Persistent Toxic Substances: Toward Virtual Elimination (Fact Sheet #5)
- Fact Sheet on Managing Ozone Depleting Solvents (Fact Sheet #12)
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Western Region Pollution Prevention Network – Janitorial Fact Sheets. http://www.westp2net.org/Janitorial/jp4.htm

World Wildlife Fund – Toxic Chemicals. Fact Sheets on 12 Priority POPs. http://www.worldwildlife.org/toxics/progareas/pop/priority.htm

Websites

Canadian Council of Ministers of the Environment. www.ccme.ca

Environment Canada - Taking Action on POPs. http://www.ec.gc.ca/pops/index_e.htm

Envirowise – FAQ. http://www.envirowise.gov.uk/envirowisev3.nsf

Nova Scotia Department of Environment and Labour, Occupational Health and Safety Division. http://www.gov.ns.ca/enla/ohs

US EPA Ozone Depletion Website - Ozone Glossary. http://www.epa.gov/ozone/index.html

What Chemicals are your Business Using?
Table 5-1

If you do:	*You may use:*	*The types of chemicals may be:*
Degreasing, parts-cleaning, manufacture, repair, and maintenance of parts and equipment	degreasers, solvents, acids/alkalis, cleaning fluids	benzene, toluene, petroleum distillates, aromatic hydrocarbons, dichloromethane
Paint preparation/removal	paint thinners, paint removers, white spirits, solvents	alcohols, ketones, acetone, petroleum distillates, isopropyl alcohol, xylene, toluene, mineral spirits, methanol, hexane, methylene chloride
Wood furniture refinishing/stripping	paint removers, varnish removers, enamel removers, shellac removers	acetone, toluene, paint solvents, petroleum distillates, methanol, alcohols, turpentine, ketones, methylene chloride
Painting/coating	enamels, lacquers, epoxies, primers, solvents, acrylics, alkyds	acetone, toluene, xylene, petroleum distillates, epoxy ester resins, methyl isobutyl, halogenated hydrocarbons
Staining	stains	mineral spirits, alcohol pigments
Furniture manufacturing/wood finishing	varnish, shellac, lacquers, polyurethane wood treatments, polish	resins, shellacs, petroleum distillates, denatured alcohols, toluene, diisocyanate, nitrocellulose
Paint brush and spray gun cleaning	paint thinners, enamel reducers, varnish removers, white spirits	acetone, toluene, methanol, methylene chloride, isopropanol, mineral spirits
Rust removal	strong acids and alkalis	phosphoric acid, hydrochloric acid, sodium hydroxide
Tank clean-out	solvents or cleaners to wash out tanks, residues	solvents, petroleum products in tanks
Textile manufacturing (dyeing and finishing)	solvents, dyes, adhesives, bleaches, lacquers, finishing agents, insecticides	benzene, toluene, ethylene dichloride, tetrachloroethylene (perc), chloroform, I,I,I-Trichloroethane, formaldehyde, polyvinylacetates, ketones
Carpentry and floorwork	adhesives, solvents, polishes and varnishes, treated wood	
Heavy construction	motor oil and other petroleum products, asphalt	
Metal manufacturing - metal cutting/machining	oils, solvents, lime metal cuttings, degreasing solvents, alkaline wastes	petroleum distillates

Metal manufacturing - cleaning and degreasing	solvents (chlorinated or hydrocarbons)	methylene chloride, toluene, benzene, dichlorobenzene, carbon tetrachloride
Metal manufacturing - electroplating	heavy metals, cyanide solutions, acid and alkaline solutions, plating solutions	zinc, copper, aluminum, chromium, sodium hydroxide, hydrochloric acid
Dry-cleaning	solvents, spot cleaners/fabric treatments	tetrachloroethylene (perc), petroleum solvents
Printing	photochemical solutions, inks (metallic pigments and solvents), lubricating oils, acid/alkaline etch and counter-etch solutions	carbon tetrachloride, ethanol, perchloromethane, methylene chloride, I,I,I- Trichloroethane
Photo-processors	process bath wastes, colour developer wastes, bleach/fix/bleach-fix waste	formaldehyde, silver thiosulfate complex
General maintenance	detergents, ammonia, acids, caustics, solvents	

Chemical Pollution Prevention Opportunities Action Table					**Module 5**		
Pollution Prevention Practice or work tasks required to achieve a goal	**Responsible Individual**	**Efficiency or Reduction Goal**	**Resources Required**	**Start Date**	**Completion Date**	**Results (reduction or efficiency achieved)**	**Savings Achieved**
Example: *Produce sign and post copies at all sinks and near floor drains in plant.*	*Jane Doe, OHS Committee Representative*	*Eliminate all chemicals from entering sewer*	*Time (x# of hours);* *$200 sign materials*	*June 1*	*July 1*		

Pollution Prevention Workbook for
Business in Nova Scotia

MODULE 6

Solid Waste Reduction and Resource Recovery in Your Business

Eco-Efficiency
Centre
*Committed to Excellence
and Efficiency*

NOVA SCOTIA
Environment and Labour

Introduction

Pollution and waste costs your business money and impacts the environment. By preventing pollution the environment is better protected and typically business liabilities are reduced, while productivity and competitiveness are enhanced.

Pollution Prevention (or P2 as it is sometimes called) is an approach that any size or type of organization can apply to both protect the environment and save money. In its simplest explanation, it is captured by the familiar saying, "an ounce of prevention is worth a pound of cure". If a company doesn't create pollution or waste, it doesn't have to devote time and resources to storing, handling, transporting, treating or disposing of it. Pollution prevention includes conserving water and energy, "green" purchasing, efficient use of raw materials, replacing hazardous products with less hazardous ones, and modifying processes to reduce waste and pollution.

This "Pollution Prevention Workbook for Business in Nova Scotia" has been designed to introduce small and medium-sized businesses to pollution prevention and assist them in making pollution prevention part of their day-to-day decision making - in effect, to help companies realize that pollution prevention efforts simply make "good business sense"!

The "Pollution Prevention Workbook for Business in Nova Scotia" contains seven modules and a directory of contacts. A business can use the entire workbook or can use individual modules one at a time. The series of modules include:

Introduction to Pollution Prevention
Getting Started with Pollution Prevention
Minimizing Risk in your Business: Pollution Prevention & Risk Management
Pollution Prevention, Water and Wastewater in your Business
Eliminating and Reducing Chemicals in your Business
Solid Waste Reduction and Resource Recovery in your Business
Efficient Energy Use in your Business

"Notice to User"

This manual is intended to provide information on the benefits of pollution prevention for businesses in Nova Scotia. It also provides information on some of the relevant laws in effect in Nova Scotia as of the date of publication. It is not intended to provide information on how to comply with all provisions of those laws which may apply to businesses.

This manual is not intended to contain a complete statement of the law in the area of pollution prevention or the environment. This manual does not replace reading the legislation and regulations. Amendments may be made to the legislation or regulations after the publication of this manual and reference should be made to the most recent official version of the legislation and regulations. Anyone needing specific advice on his/her own situation should seek advice from a lawyer or an environmental expert. Examples and interpretations given are not binding on the Crown.

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Alberta Department of Environment

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We encourage businesses to produce copies of the Workbook as a reference for their pollution prevention efforts and to educate employees. The content of the Workbook is not to be altered without permission from the sponsoring agencies. The Workbook is designed to be updated and amended on a periodic basis. Check the Nova Scotia Environment and Labour website (www.gov.ns.ca/enla) to determine if you have the most recent edition.

February 2003

Solid Waste Reduction and Resource Recovery in Your Business
Module 6

Did you know? Eight-eight percent of Nova Scotian small and medium sized businesses surveyed in 2000 said that they would find information on waste reduction useful. Eighty percent said that they have also taken steps in the last 3 years to reduce the amount of waste they generate. Waste reduction is clearly on the mind of Nova Scotia businesses!

This module includes the following:
- *Kick-Off Quiz*
- *Gathering Key Pieces of Information*
- *Primer: Waste Reduction and Recovery*
- *Environmental Legislation*
- *Checklists: Assessing Opportunities and Best Practices for Your Business*
- *Tools and Tips for Business*
- *References and Resources*
- *Opportunities Action Table*
- *Success Stories and Case Studies (throughout)*

6.1 Introduction

We spend a tremendous amount of time, effort and money on managing and disposing of our solid waste. In industrialized countries, we use up to 85 tonnes of natural resources per person per year - this is equivalent to 300 filled grocery bags per person PER WEEK [1]! As a society, we have tended to measure the strength of our economy in terms of production and consumption. But, we don't measure the true costs and environmental impacts of resource extraction and processing, manufacturing, distribution, and the enormous amounts of waste created at each of these steps. Our approach to waste management has been directed at managing the waste after it has been created - landfilling, incinerating, and more recently on recycling and composting - not at how we can generate less waste in the first place.

Nova Scotia is leading Canada in diverting solid waste from disposal through a province-wide program of recycling and composting. Because of the success (and convenience) of our recycling and composting programs, it is particularly easy to dismiss the fact that we also need to generate less waste in the first place - through pollution prevention!

While recycling and composting are critical parts to managing solid waste for every company, using a pollution prevention approach can result in the reduction of waste. A company needs to look at how to reduce waste and improve the efficiency of how it makes products, how these products are used, and what is done with them when they are no longer needed.

Like other pollution prevention initiatives, incorporating solid waste reduction strategies into an overall pollution prevention plan can have a number of benefits for business, including:
- Reducing procurement costs.
- Increasing efficiencies and productivity.
- Assisting in achieving compliance with environmental legislation.
- Gaining competitive advantage.
- Reducing environmental impacts and conserving resources.
- Enhancing public image and improving community relations.
- Reducing waste disposal costs and tapping into new revenue streams.

Reducing solid waste through pollution prevention in your company also benefits the larger community by:
- Ensuring a cleaner environment.
- Reducing greenhouse gas emissions.
- Reducing pollution and health risks.

- Extending the life of landfills and reducing costs associated with siting and construction of new landfills.

Whatever your incentive, reducing waste in your business is a smart decision and makes good business sense. By using a pollution prevention approach in your company, you can eliminate pollution and inefficiencies, and improve the bottom line. You simply become a better business.

This module, "Solid Waste Reduction and Resource Recovery in Your Business" will provide your business with practical information, ideas, tools, and resources on how you can effectively reduce solid waste in your company by focusing on preventing pollution. Recovery of materials through reuse, recycling and composting efforts will also be covered.

Regional Success Story: Oland Brewery, Halifax , NS

In the early 1990's, as a result of an environmental audit, this brewery undertook a number of environmental improvements. They analyzed their solid waste stream and over a 5 year period they changed procedures and reduced the amount of solid waste sent to landfill by over 70%, from 275 tractor-trailer loads to 78 loads/year. This saved the company in the order of $200,000. They also undertook some water conservation initiatives (See module 4).

6.2 Kick-Off Quiz

Before starting this module, take our Kick-Off Quiz to see how your company currently rates on pollution prevention and solid waste reduction. Scoring works as follows: no = 0 points, somewhat = 1 point, and yes = 2 points. Write your score in the blank provided at the end of each question.

1. Does your company measure the amount of solid waste produced in the various areas of your operation - e.g., offices, warehouse, retail area, shop, lunch room, property? *(Understanding what your wastes are and how much waste your company is generating will help you to develop the most cost effective, waste reduction program.)* ________
2. Do you know how much you pay for raw materials on a monthly basis? *(By understanding your total costs, including the cost of raw materials, you can better appreciate the economic benefits to reducing waste in your company.)* ________
3. Has your operation examined ways to reduce the generation of solid waste in the facility? *(Remember that preventing waste in the first place will have the most impact. Explore all source reduction options before considering recycling.)* ________
4. Has your operation examined ways to reuse solid waste produced in your facility? *(You may be able to reuse products. Recycling/reuse in-house is more cost effective and better for the environment than off site recycling.)* ________
5. Are you up-to-date with existing provincial and municipal legislation concerning solid waste management? *(Many companies are recycling cardboard, but there are a number of other materials generated by businesses that must be diverted from landfills.)* ________

Total Score: ________

If you scored between 8-10, good work! Keep it up!
Between 4-7, you are not doing too badly but could likely improve and reduce your company's environmental impacts.
Between 0-3, you need help, but there's lots of assistance available. Read on!

6.3 Gathering Key Pieces of Information

There is some baseline information that will be useful to have on-hand as you work through the various modules of the Workbook. By compiling your company's data on solid waste generation, disposal/handling costs, you will better understand your current performance and can identify areas for targeting pollution prevention efforts. Baseline data also provides a reference point for monitoring progress and savings, and allows you to compare your performance against industry standards. In this section of the module, record the key pieces of information. Some of this information may be readily available through purchasing, hauling and sales records. Information may be available from previous surveys or audits. A facility walk-through and a discussion with key staff will uncover some of the information. You will need to estimate some figures. You probably have access to weekly and monthly information - by converting to annual figures, a better appreciation of the scale of current costs and inefficiencies can be gained, along with the savings that can be achieved.

Did you know? *Managing solid waste is expensive. In Nova Scotia, the gross cost of managing municipal waste, recyclables and compostable material is approximately $80 million.*

Did you know? *50% of waste can be reduced by adopting "good housekeeping" practices and making small operational changes. (From: United Nations Environment Programme)*

Solid Waste Data

Types of Solid Waste Produced	Quantity (Annually)	Cost (Annually)
- office paper		
- cardboard		
- lunch room		
- other		
Total Solid Waste Produced		
Raw Materials/Product		

Nova Scotia Success Story: Metrographic Printing, Dartmouth, NS

Metrographic Printing is a commercial printing business in Burnside Industrial Park in Dartmouth, Nova Scotia that specializes in the use of recycled papers and vegetable-based inks. Since beginning its operation in 1975, Metrographic has been actively working to be a better environmental performer in all areas of waste reduction. Early on, their staff of eight recognized the importance of reducing waste. They adopted several practices that help the environment by diverting and reducing solid waste, and that bring about major cost savings.

Metrographic recycles aluminum, corrugated paper, film and aluminum printing plates, printer and toner cartridges, ink containers, paper cups and milk cartons. By implementing practices such as the "order as you need it" policy, and inspection of materials upon arrival, fewer expired or damaged materials go to waste. Shop rags and hand towels are provided and cleaned through a laundry service. All packaging and shipping orders utilize used corrugated boxes (approximately 500 per year) with excess brown paper packaging used as packing filler (diverting an estimated 130 bags of garbage per year). An electronic image processor is used, cutting waste and time spent in artwork and production stages. They still generate an estimated 4450 kgs. of office paper per year; what's not reused in-house for notepads goes for off-site recycling. Metrographic Printing also adopted an organics "take it home" policy (diverting an estimated 26 garbage bags of organic waste per year).

The result is that Metrographic Printing produces just two garbage bags per week of materials to be collected by their regular waste hauler. They estimate savings of approximately $300 per year in disposal fees, showing how taking small steps in your business brings major benefits for the environment as well as cost savings for your business.

Metrographic Printing informs their staff of continuing environmental practices occurring within the company. They have even used their annual Christmas card to publish a "mini environmental report"! Information included both environmental benefits (number of trees saved, pounds of effluent not emitted, gallons of water conserved) and financial benefits (dollars saved in disposal fees) to inform staff, but also suppliers, and customers of their priorities and results.

For more information contact:
Metrographic Printing Services Ltd.
80 Raddall Ave., Unit 2
Dartmouth, NS B3B 1T7

6.4 Primer: Waste Reduction and Resource Recovery

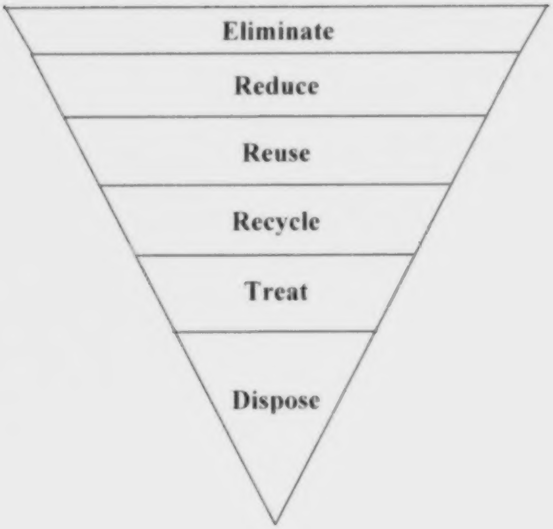
"If it's filling your dumpster - it's costing you money" - Paul Fitzgibbons, Web Atlantic, Halifax, NS

Before your company begins to consider ways to improve the management of solid waste, become familiar with the most common definitions and terminology used.

"Find pollution or waste and you've found something you've paid for but can't sell" - Peter Coors, CEO, Coors Brewing Co.

The Solid Waste Management Hierarchy

You've probably heard about the 3R's - Reduce, Reuse and Recycle, with reduce being the preferred option for managing waste. Recently a fourth has been added - RETHINK! We need to rethink our consumption and how we conduct our activities. From most preferred to least preferred, the solid waste management hierarchy basic hierarchy is as follows:



Source Reduction

As outlined in earlier modules, source reduction means activities that prevent waste "at its source". It includes techniques or procedures that eliminate or reduce the amount of waste being generated. Avoidance and reduction options offer the most benefits to both the environment and to your business. First, financial benefits are realized by eliminating storage, transport, recycling and disposal costs. In addition, the environmental benefits include the conservation of natural resources, the reduction of energy use for handling and transportation of the material from extraction to disposal, and the avoidance of possible adverse environmental affects resulting from its disposal. Source reduction can be achieved through the modification or changing of a process, adopting new technology or using another material. A common example in business practices is reducing the amount of packaging.

I already recycle - isn't that enough? *Reduction and reuse eliminate waste handling and disposal costs. With reuse, energy and raw materials are not used to manufacture new products. Recycling requires infrastructure to collect, transport and process recyclables. Recycling involves building facilities to remanufacture recyclable materials. These activities require energy and resources to undertake, and still result in pollution and waste.*

Reuse

Reuse means using a material or product again in its original form. For companies, reuse can range from reusing office furniture to using shredded paper for outgoing packages. Reuse within your own facility is preferable.

Approximately 80% of office waste is paper. One tonne of recycled bond paper saves about 68 trees. (From: Clean Nova Scotia - Waste Reduction Facts - http:///www.clean.ns.ca/webnew/docs/wrfacts.html)

There is an online "Directory of Solid Waste, Reuse, Recycling and Composting Contacts in Nova Scotia" at http://www.gov.ns.ca/enla/emc/wasteman/contents.htm#table. This was developed to assist businesses, institutions and individuals with identifying reuse, recycling, composting, and disposal opportunities in the province. The Directory provides a list of haulers, recyclers, equipment suppliers, and other waste-resource related contacts throughout the province.

Recycling

Recycling means using a material or product again to make another product. It is controlling the material/waste after it has been produced. It is not considered a pollution prevention technique unless the recycling is undertaken in-house, that is within the facility where the waste is generated.

Resource Recovery

As you've already read, when pollution prevention and recycling are implemented, you benefit by reducing what's go from our waste by viewing it as a resource and an opportunity, instead of as a waste and a liability. To this end, at least 1000 jobs have been created over the last six years as a result of programs to reduce, reuse, recycle and compost. In some cases, diverted materials are sent out of province where they are recycled, but many companies have been established in Nova Scotia to turn these resources into new products. There are many businesses in Nova Scotia involved in reuse, repair, remanufacturing and recycling.

6.5 Environmental Legislation

Federal Regulations

The federal government is not heavily involved in solid waste management.

Under the Nova Scotia Environment Act it is an offence to release a substance into the environment that may cause a significant adverse effect (impairing or damaging the environment).

Provincial Regulations

In Nova Scotia, solid waste issues are regulated under the Solid Waste-Resource Management Regulations pursuant to the Environment Act. This regulation was designed in large part to:

- Achieve a nationally set target of 50% diversion of solid waste from disposal sites by the year 2000.
- Protect the environment.
- Promote industry stewardship.
- Encourage development of economic opportunities.

There are many activities and types of businesses that require an approval from the Nova Scotia Department of Environment and Labour. Modifications to a designated activity also requires an approval. For information on approvals, contact your local Department of Environment and Labour office (see Module Eight for contacts) or visit the Government of Nova Scotia Website at http://www.gov.ns.ca/just

What waste materials are legislated by the Province of Nova Scotia?

There are now province-wide bans on the disposal of many materials:

- Corrugated cardboard
- Newsprint
- Beverage containers
- Steel/tin
- Glass food containers
- Automotive batteries and antifreeze
- Used tires

- Waste paint
- Selected plastics
- Compostable organic materials (food waste, leaf and yard waste, and non-marketable or soiled paper).

Open burning of municipal solid waste is banned, and many dumps have been closed. New disposal sites must meet strict environmental guidelines.

In addition to the Solid Waste Resource Management Regulations, and Asbestos Waste Management Regulations, there are also guidelines for Construction and Demolition Debris Disposal Sites, Composting Facilities, and Municipal Landfills.

The Activities Designation Regulations require businesses and individuals to obtain approvals for specific activities.

Municipal Regulations

In accordance with the Nova Scotia Solid Waste-Resource Management Regulations, the 55 municipalities in the province are required to manage the solid waste within their geographical jurisdictions.

How do I know what to do with my solid waste and recyclable and organic materials?

Many Nova Scotia municipalities are developing extensive programs and in some cases, more restrictive by-laws. For example, the Valley Waste-Resource Management Authority (http://www.vwrm.com/) is comprised of 8 municipal partners that share a common waste management bylaw - the Valley Region Solid Waste Resource Management Bylaw. Within this bylaw, businesses and organizations in the IC&I (industrial, commercial and institutional) sector are legally required to sort their waste. Businesses failing to separate may be prosecuted - fines range from $500 to $5000 per day. Several municipalities are working to keep construction and demolition (C&D) materials out of their landfills.

Since the Solid Waste Management Strategy came into effect, Nova Scotians have come a long way in our diversion efforts. Some impressive statistics follow:

- *We are the only province in Canada to have achieved a target of 50 % diversion by the year 2000.*
- *We currently have more than 85 Enviro-Depots®, 9 municipal recycling facilities, 18 composting operations, and only 18 disposal sites remaining in the province (down from 40"dumps" in 1995).*
- *Almost 100% of residents have access to curbside recycling. 75% have access to the curbside collection of organic materials.*
- *Formal programs are in place to assist in the recycling of beverage containers, milk containers, tires, sharps, derelict vehicles, used oil, and waste paint*

If you have questions about the requirements for separation of waste materials, collection and disposal in your area, contact your municipal office. The contact information for each municipality is listed in Module Eight of this Workbook.

The Canadian Council of Ministers of the Environment (CCME) works to promote the cooperation and coordination of interjurisdictional issues such as waste management. CCME was involved in endorsing the National Packaging Protocol (NAPP), a voluntary agreement with industry to reduce packaging waste. The former National Task Force on Packaging set and pursued targets and policies for the minimization of packaging waste - the overall goal of reducing total packaging waste disposal by 50% by the year 2000 was achieved in 1996, four years ahead of schedule.

Nova Scotia Success Story: Canadian Maritime Engineering Ltd., Dartmouth, NS

Canadian Maritime Engineering Ltd. (CME) is an ISO 9002 certified industry leader in the inspection, refurbishment and repair of natural gas and diesel engines. CME employs approximately 60 people in their Dartmouth, Nova Scotia facility. CME is not much different from many small and medium-sized companies. They are concerned with the day-to-day operation of keeping their business profitable, offering quality service and products, and are always looking for new business opportunities. But, a special interest in operating their business in an environmentally responsible manner makes CME stand out. CME combined their innovation, eye for opportunity and their interest in the environment to handle a problem with both economic and environmental implications. One of the many pieces of equipment that CME has in its facility is a large plate roller, used in their fabrication process. To purchase a new plate roller to take care of smaller, specialty jobs would cost them in the range of $20,000 - an expensive proposition. At the same time, there was a growing pile of used (but expensive) machinery in storage around the shop. A win-win resolution for the two issues came when it became clear that they could build their own by reusing their waste materials. The "new" plate roller took 200 man-hours to construct and it was built largely out of the used materials. The total cost was around $8,000. It has been operating successfully for the last 24 months. Based on an estimated performance of 400 hours per year, the unit is generating an additional $26,000 per year for CME.

The success of this venture, and that of ongoing programs has prompted several additional ideas, notably the construction of a Flange Facer and Head Testing unit. The Flange Facer, fabricated mainly from used parts, was built to provide local capability to machine flanges 4-12 feet in diameter. Montreal had been the closest Canadian site to perform work on units of this size. A new unit would have cost $200,000; CME built theirs for about $35,000, labour included, and it now provides local capability for this work. The newly fabricated cylinder head testing unit has recently replaced a very inefficient one. It had been recommended by staff and was also constructed from reused equipment. No cost saving information is available yet but it is felt that they will be considerable. Some other initiatives that have taken place this year include: spill kits in all vehicles; a commitment for a 50% reduction in disposal to garbage from oily rags, absorbents, oil filters, and other contaminated wastes; and discounts offered in contracts for recycled/refurbished material and equipment

What all of these signify, big and small, are integrated approaches to problem solving and a work place culture that discourages the default mentality of discarding equipment, simply because it is no longer of service in a given application.

For further information contact:
Canadian Maritime Engineering
90 Thornhill Dr.
Dartmouth, NS B3B 1S

A waste audit guide is available from the RRFB Nova Scotia. The guide will help you assess the current generation of solid waste, plan changes and move towards the development of an action plan. To view the guide, visit www.rrfb.com.

6.6 Checklists: Assessing Opportunities and Best Practices for Your Business

The next section uses checklists to help you identify where waste reduction and resource conservation opportunities may be identified in your business. Don't forget - the checklists are provided to help you determine pollution prevention opportunities, but they are only a starting point for your company. Watch for other opportunities that will be specific to your particular business.

A. Checklist – Process				
	Yes	No	Don't Know	Not Applicable
Purchasing				
Are you ordering supplies with an indefinite shelf-life in bulk?				
Are you returning damaged goods to suppliers instead of throwing them away?				
Can you use returnable or reusable containers?				
Do you work with your suppliers to reduce packaging?				
Are you buying equipment that is well built and easily repaired?				
Are you refurbishing your old equipment?				
Do you purchase used equipment or furniture when feasible?				
Are you reusing packaging materials for outgoing shipments (e.g., cardboard, shrink-wrap, polystyrene, bubble-wrap, shredded used office paper)?				
If you can't reuse packaging, are you able to package your products in materials that are recyclable or reusable?				
Can you rent infrequently used equipment?				
Production Line				
Does your company take back used products or parts and integrate them in the production process again?				

Does your company use raw materials that require less frequent equipment cleaning?				
Can your product be redesigned to achieve the same function, but with less material input?				
Can you streamline existing procedures and processes to reduce the quantity of raw material wasted?				
Do you keep up-to-date on new technologies that may eliminate or reduce waste in your production?				
Are all banned materials being diverted from your garbage?				
Have you examined all other waste by-products to determine if other materials can be diverted for recycling, composting, resale or exchange?				
Can you exchange waste with a neighbouring business or organization?				
Are wastes separated appropriately and kept clean to increase recyclability?				
Do recycle bins have good signage to clarify the separation process or are they distinguishable by colour or shape?				
Are recycle bins in convenient locations so staff will use them instead of garbage containers?				

B. Checklist – Office				
	Yes	**No**	**Don't Know**	**Not applicable**
Purchasing				
Do you sell old office equipment to employees or donate it to reuse centres or charitable organizations?				
Can staff share journals, newspapers and magazines instead of ordering multiple copies? *Give away old copies to interested organizations or staff.*				
Are you purchasing remanufactured cartridges, stationary with a high-recycled content and other office supplies with recycled and/or recyclable content? *Consider solar-powered calculators, refillable pens, pencils and tape dispensers, and reusable calendars.*				

Are spent photocopier, fax and printer cartridges, and printer ribbons sent for remanufacturing or back to the supplier?				
Can you discourage the use of straws, paper napkins and disposable plastic stir sticks in the lunchroom? *If you have to purchase disposables, try wooden stir sticks and paper napkins made from 100% recyclable wood fibres and compost them after use.*				
Do you purchase any lunchroom condiments such as coffee, sugar and cream in bulk and dispense in reusable containers?				
General Office Practices				
Have you ensured that photocopying and printing are double-sided?				
Do you avoid over production of marketing and publicity materials by reviewing distribution lists and regularly updating databases?				
Have you ensured that fax machines, photocopiers, and printers are all programmed so they do not produce unwanted header or report sheets?				
Is electronic communication encouraged to reduce faxing and printing? *Encourage staff not to print out emails unless necessary.*				
Do you encourage single spacing documents?				
Do you edit documents on the computer screen instead of printing out a rough copy?				
Can you establish a reuse centre in the office where employees can pick up unwanted binders, stationary supplies, etc. for use at home?				
Have you encouraged employees to bring drinks, soups, sandwiches, etc. in reusable or refillable containers? Do you provide or encourage staff to bring reusable mugs reusable utensils, and ceramic or china mugs, glasses, plates, and bowls?				
Do you have organics and recycling collection programs in place?				

C. Checklist – Employee/Customer Education				
	Yes	**No**	**Don't Know**	**Not Applicable**
Are employees trained on the proper operation of equipment to eliminate waste through misuse and ensure that all equipment is regularly serviced to prevent malfunctions?				
Have you incorporated information on your solid waste management program as part of staff training?				
Are you encouraging staff to reduce waste? *Consider providing incentives for ideas and exceptional employees, posting signs, donating recycling profits to employee programs or socials, providing quick responses to employee questions, and creating contests to maintain interest in the program.*				
Are you letting your customers know about your efforts to reduce waste?				

In going through this checklist, did you identify some potential opportunities? Keep a record of the low-cost/no-cost practices in the Solid Waste Opportunities Action Table for follow-up. The Table is provided on the final page of this module. If you have identified options that are more complex or require potentially capital intensive, they will require additional in-depth investigation on your part. Use the Feasibility Assessment Checklist provided in Appendix B to help determine economic and technical feasibility, and potential environmental impact. Always remember that requirements legislated by municipal, provincial and federal authorities must be priorities and should not be assessed for feasibility.

***The Nova Scotia Waste Materials Exchange**. Waste materials exchanges are components of many municipal and provincial/state solid waste management programs across North America. To help Nova Scotia businesses, organizations and individuals conserve resources, reduce their impact on the environment, and save money by helping them to conveniently identify alternatives to the disposal of wastes, the Nova Scotia Materials Exchange is now available. Access it at http://www.nsmaterials.com/*

A local example of industry sharing responsibility for the products it generates is seen in the paint stewardship agreement. This agreement has resulted in the Nova Scotia Paint Recycling Program launched during the summer of 2002. Nova Scotians, including businesses, can return leftover latex and oil-based paints to Enviro-Depots® at no charge. The leftover paint is recycled into a new brand of recycled paint called Nature Colours, which is available at paint retailers throughout the province.

6.7 After Reducing and Reusing what do I do? The Third R – Recycling

Extended Product Responsibility
In response to pressures from governments, consumers and shareholders throughout North America, industry is taking more responsibility for the environmental impacts of the products they are involved in producing. One example of how companies put this attitude of "extended producer responsibility" or "EPR" into practice is through product stewardship activities (such as newspaper, and beverage containers product stewardship programs). Voluntary "take-back" and "end-of-life" producer stewardship management programs are also becoming more common.

One example of a North American wide take-back program is the Rechargeable Battery Recycling Corporation (RBRC)'s *Charge Up to Recycle!* program to recycle the portable rechargeable batteries. There are now over 30,000 retail and community battery collection locations throughout the U.S. and Canada that participate in RBRC's battery recycling program. Many Nova Scotia home supply and hardware stores participate in this program. The RBRC organization is funded by manufacturers and marketers of portable rechargeable batteries and products (for more information on this program, check their website at http://www.rbrc.com). In the U.S., more and more electronic manufacturers are getting involved in offering take-back programs. Many of these programs are not available or are limited in Canada at this time.

Effective Collecting and Recycling Programs
At a minimum, every business is required to eliminate banned items, including organics, from entering the regular garbage stream though reducing, reusing, and recycling. Once you've exhausted pollution prevention efforts of reducing and reusing, make sure you put effective recycling programs into place. This section of the module provides some tips for helping to implement better collection and recycling programs in your business.

General Tips:
- Speak with your municipal or local waste authority about how to handle all components of your solid waste stream.
- Label and/or colour-code bins appropriately. List the specific materials that can (and cannot) go into the bins. Ensure that it is convenient for staff to recycle - identify appropriate locations in your business to collect recyclables. Ensure any containers are appropriately sized.
- If you have the time and resources to transport your recyclables, and if the volume is manageable, employees may be able to drop

off materials to recycling/waste management facilitates at no charge. Contact local Enviro-Depots®, haulers, or your municipal/waste authority office for specifics.

- Plan to spend some time educating everyone about the improvement to your waste management system. Be sure to offer assistance and resources.
- Designate an environmental champion to do regular checks on the system's effectiveness and employee compliance.
- Use colourful source separation signs available from the RRFB.
- Ensure that your haulers are disposing of your recyclables and regular waste in the proper way. Ask questions to determine to which facilities they take your materials.
- Illegal dumping and theft of recyclables are often major problems for the business community. There are ways to decrease the possibility of theft including, asking neighbouring companies to watch for illegal dumping, restricting access to authorized employees, keeping the dumpster locked, posting more signage, and purchasing or renting surveillance equipment/camera.
- If nearby businesses also need to get rid of similar waste, you may be able to share the service and costs with them.

Items to Target in Your Bins:

- ***Cardboard*** - Clean corrugated cardboard is banned from disposal in Nova Scotia. Corrugated cardboard can be identified by its wavy middle layers.
  Tip: Ask haulers or local authority about waxed cardboard - some facilities may be able to take it.
- ***Plastics*** - Clean pallet wrap and some other plastics are banned from disposal in Nova Scotia landfills.
  Tip: Some hauling companies allow businesses to place segregated plastics (bagged in clear plastic bags) in cardboard or paper bins for no additional charge. Talk to haulers for options.
- ***Paper*** - Although not banned from landfills, paper is a valuable and highly recyclable product.
  Tip: Place paper-recycling containers near high paper areas such as photocopiers and printers. Provide desk-side containers.
- ***Organics*** - Compostable organic material (food waste, yard waste, soiled and non-marketable paper products) is banned from disposal in Nova Scotia.
  Tip: Since organic waste is largely generated from employee lunches, the staff room should be equipped with a bin/bag for organic waste. Disposal solutions for businesses include implementing a "Take-It-Home" policy, implementing an on-site composting program (vermicomposting or backyard composting), implementing a green bin program with a hauling company, or sharing a green bin with a neighbouring business.
- ***Boxboard*** - Boxboard is often confused with cardboard because it

***RRFB Nova Scotia** is a not-for-profit agency that:*

- *Negotiates industry stewardship agreements*
- *Operates the deposit-refund programs for beverage containers, tires and paint*
- *Supports municipal waste management and public education efforts*
- *Fosters value-added manufacturing sector*

RRFB Nova Scotia is responsible for establishing the Enviro-Depots® throughout the province. To find an Enviro-Depot® near you, check the RRFB Nova Scotia website at http://www.rrfb.com; click on 'List of Enviro-Depots®' for addresses and phone numbers. All Enviro-Depots® accept certain materials (beverage containers, newsprint, and paint). Check with individual operators for information about other materials that may be accepted - batteries, paper, metals, etc.

Remember that there are differences in how recyclables are handled by municipalities across the province. Businesses should inquire at municipal offices or with regional waste coordinators/waste authorities for the most up-to-date details. Contact information for these organizations is located in Module Eight, or visit the Department of Environment and Labour Website at www.gov.ns.ca/enla/emc/wasteman/contacts.htm#red).

has a similar form, but it does not have the wavy middle layers. Tip: Some areas accept boxboard in paper collection programs; in other areas of the province, boxboard goes into the organics stream/green bins. Soiled boxboard can be composted.

- ***Beverage Containers*** - Refundable beverage containers are banned from disposal in Nova Scotia.
  Tip: Companies have developed many innovative ways to manage beverage container programs in their business and how to use the monies collected. The money may be used to buy supplies for the lunchroom, be donated to a charity, or go towards a social fund for the employees. Charities and organizations are often willing to collect refundables on a regular schedule from businesses.
- ***Toner cartridges*** - There are a number of options available to companies instead of sending used cartridges to the garbage.
  Tip: A number of companies and organizations will accept used cartridges for remanufacturing and/or recycling. Some will arrange free pick up on an "as-needed" basis if you are purchasing a replacement cartridge. Some cartridge manufacturers have arrangements to handle used cartridges. Some stores now accept some types/brands of used cartridges at their retail outlets. Check with office supplies and retail stores as to the availability of these programs.

Case Study:
BMC West Building Materials (Oregon) supplies building materials to contractors and homeowners. #1 - Metal banding on shipments of lumber is cut and then stored for reuse. The banding is rolled and stored on the back of forklifts or in a box in the customer loading area. To use smaller pieces of banding, a crimper and clips are used to join material of the same width into pieces of sufficient length. BMC uses a style of banding gun that can be adjusted to fit a variety of widths. Financial Savings: $2,000/year. #2 - Doors arrive layered between thin plywood sheets (skins) and stacked on pallets. BMC West initiated a process to return the skins and pallets to the door distributor for reuse. Pallets are returned to distributors whenever possible. Damaged pallets are donated to a local supplier. Some plastic wrap on incoming loads of lumber is saved and reused on outgoing customer loads. Financial Savings: more than $500/year. #3 - Usable scrap and defective wood is sorted, banded into bundles of mixed types and sold at a discount. The paint department buys back clean five-gallon paint buckets from contractors. These are sold to retail customers for mixing paint.

- ***Office Equipment*** - Many companies have old equipment, especially computers and other electronics, stockpiled.
  Tip: Many charities, non-profit groups, and companies accept donations of used goods, including computers for reuse or for parts. Contact your municipality or local waste authority about leads in keeping these items out of landfills.
- ***Paint*** - Waste paint is banned from disposal in Nova Scotia. A paint-recycling program is now in effect. Consumers (including businesses) can return surplus paint to Enviro-Depots® at no charge. The paint is shipped to a paint-recycling operation, and is turned into recycled paint. Check the RRFB Nova Scotia website or with the Enviro-Depots® for details as to the types of paint accepted.
  Tip: You can also talk to your paint suppliers, or head office, about accepting obsolete or mis-tinted paints & paint containers. And, there are organizations/agencies that will accept used paint.
- ***Construction and Demolition (C&D) Materials*** - Many regions do not allow C&D waste to go into their landfills. Privately owned C&D Disposal Sites accept materials like wood, brick, concrete, asphalt, shingles and drywall that may be reused or recycled.
  Tip: It is often cheaper to deliver source separated C&D materials to be recycled and reused.
- ***Batteries*** - Automotive or lead-acid batteries are banned from disposal in Nova Scotia. They may be recycled at Enviro-Depots, scrap metal dealers and many retailers. Rechargeable Sealed

Lead-Acid Batteries (SLAs) can be recycled through the RBRC *Charge Up to Recycle!* Program or with most organizations that recycle automotive batteries. Although not banned from disposal, dry-cell batteries (disposables, specialty batteries like button cells, and rechargeables) contain a variety of heavy metals and should be managed appropriately.
Tip: Make recycling of rechargeables and button cells a priority, and then consider programs for other types of disposable batteries. Contact Enviro-Depots®, battery retailers, or the RBRC *Charge Up to Recycle!* Program for options.

- *Scrap Metal* - Metal by-products are usually highly valuable and relatively easy to recycle. Separating the metals will also increase value.
  Tip: Some scrap metal dealers will pay you for your scrap metal, and some will pick these metals up from you at no charge.
- *Wood Waste* - One common wood waste problem in business is excess pallets. Make sure that you are reusing pallets internally to the full extent. Consider rental systems that allow the reuse of pallets over and over again, or consider an arrangement with a company or individual that will re-use or recycle your pallets. Many local non-profit organizations with work activity programs use wood from damaged pallets to make crafts & other products.
  Tip: Prolong your pallets' usefulness by training forklift operators, warehouse crew and other employees on better pallet handling.

If you have other materials in your organization that can't be reduced or reused and you are unsure about recycling, speak with your municipality or local waste authority about options. Try listing the materials on the Nova Scotia Materials Exchange at http://www.nsmaterials.com.

Case Study:
Bergen Brunswig's Medical (Oregon) office and warehouse provides medical and surgical supplies to more than 1,000 hospitals, clinics, nursing homes, and medical offices. They have 40 employees. #1 - Reuses vendor supply boxes to ship orders to customers. Empty supply boxes are stored near the product re-packing area for convenient reuse. This has reduced the purchase of new shipping boxes by two-thirds. Financial Savings: $22,500/year, plus reduced staff time for assembling new boxes and recycling. Resource Savings: 13,600 kgs. of paper boxes/year. #2 - Eliminated the purchase of polystyrene packing "peanuts" and paper dunnage for packing. Shipping boxes are packed with shredded paper from the accounting office and newspaper supplied by employees. Any "peanuts" received are reused. Financial Savings: $5,000/year. Resource Savings: 5440 kgs. of paper/year, plus "peanuts". #3 - Two-thirds of all pallets received are reused for large-volume orders. Other pallets are sold to a company that repairs and resells them. Financial Savings: $36,700/year. Resource Savings: 109+ tons/year.

From: Oregon Department of Environmental Quality's Solid Waste Policy and Program Development Section http://www.deq.state.or.us/wmc/solwaste/cstudy.html

6.8 References & Resources

Resources

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Recycling Council of Ontario. Material Fact Sheet Series. http://www.rco.on.ca/publication/factsheet.html

Tourism Industry Association of Nova Scotia. 1996. A Question of Balance: Sustainable Tourism Self-Audit Workbook.

United Nations Environment Programme's Division of Technology, Industry and Environment (UNEP DTIE) and the Wuppertal Institute for Climate, Environment and Energy. Efficient Entrepreneur: A Calendar for Small and Medium-Sized Enterprises. http://www.efficient-entrepreneur.net/index2.html

US EPA WasteWise Program - Preserving Resources, Preventing Waste http://www.epa.gov/wastewise/

Xerox. 1998. Business and the Environment: Solutions for a Changing World - Business Guide to Waste Reduction and Recycling. http://www.getf.org/file/toolmanager/O16F7319.pdf

Websites

Almeda County Waste Management Authority – Business Assistance Program
http://www.stopwaste.org/fsbusiness.html

California Integrated Waste Management Board
http://www.ciwmb.ca.gov

Kentucky Pollution Prevention Center http://www.kppc.org

Lawrence Berkeley National Laboratory Environmental Energy Technologies Division. Cutting Paper http://eetd.lbl.gov/paper

Nova Scotia Department of Environment and Labour – Solid Waste Resource Management Program.
http://www.gov.ns.ca/enla/emc/wasteman/

Nova Scotia Materials Exchange. www.nsmaterials.com

RRFB Nova Scotia. www.rrfb.com

Solid Waste Management Coordinating Board (Minnesota). Resourceful Waste Management Guide - A Business Guide On How To Recycle or Dispose Of Just About Anything.
http://www.swmcb.org/rwmg

US-EPA, WasteWise. http://www.epa.gov/wastewise/

Solid Waste Pollution Prevention Opportunities Action Table					**Module 6**		
Pollution Prevention Practice or work tasks required to achieve a goal	**Responsible Individual**	**Efficiency or Reduction Goal**	**Resources Required**	**Start Date**	**Completion Date**	**Results (reduction or efficiency achieved)**	**Savings Achieved**
Example: Change to double-sided printing on all printers and photocopiers.	*Jane Doe, Office Manager*	*50% reduction in paper used*	*Time (x# of hours)*	*June 1*	*June 8*		

Pollution Prevention Workbook for
Business in Nova Scotia

MODULE 7

Efficient Energy Use in Your Business

Eco-Efficiency
Centre
*Committed to Excellence
and Efficiency*

NOVA SCOTIA
Environment and Labour

Introduction

Pollution and waste costs your business money and impacts the environment. By preventing pollution the environment is better protected and typically business liabilities are reduced, while productivity and competitiveness are enhanced.

Pollution Prevention (or P2 as it is sometimes called) is an approach that any size or type of organization can apply to both protect the environment and save money. In its simplest explanation, it is captured by the familiar saying, "an ounce of prevention is worth a pound of cure". If a company doesn't create pollution or waste, it doesn't have to devote time and resources to storing, handling, transporting, treating or disposing of it. Pollution prevention includes conserving water and energy, "green" purchasing, efficient use of raw materials, replacing hazardous products with less hazardous ones, and modifying processes to reduce waste and pollution.

This "Pollution Prevention Workbook for Business in Nova Scotia" has been designed to introduce small and medium-sized businesses to pollution prevention and assist them in making pollution prevention part of their day-to-day decision making - in effect, to help companies realize that pollution prevention efforts simply make "good business sense"!

The "Pollution Prevention Workbook for Business in Nova Scotia" contains seven modules and a directory of contacts. A business can use the entire workbook or can use individual modules one at a time. The series of modules include:

Introduction to Pollution Prevention
Getting Started with Pollution Prevention
Minimizing Risk in your Business: Pollution Prevention & Risk Management
Pollution Prevention, Water and Wastewater in your Business
Eliminating and Reducing Chemicals in your Business
Solid Waste Reduction and Resource Recovery in your Business
Efficient Energy Use in your Business

"Notice to User"

This manual is intended to provide information on the benefits of pollution prevention for businesses in Nova Scotia. It also provides information on some of the relevant laws in effect in Nova Scotia as of the date of publication. It is not intended to provide information on how to comply with all provisions of those laws which may apply to businesses.

This manual is not intended to contain a complete statement of the law in the area of pollution prevention or the environment. This manual does not replace reading the legislation and regulations. Amendments may be made to the legislation or regulations after the publication of this manual and reference should be made to the most recent official version of the legislation and regulations. Anyone needing specific advice on his/her own situation should seek advice from a lawyer or an environmental expert. Examples and interpretations given are not binding on the Crown.

Acknowledgments

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Resource Recovery Fund Board
Service Nova Scotia and Municipal Relations
Nova Scotia Department of Energy
University College of Cape Breton
Nova Scotia Power Inc.
Environment Canada
Eco-Efficiency Centre
Nova Scotia Environment and Labour
Daisy Kidston and Christine Ann Smith, MES students at Dalhousie University
Alberta Department of Environment

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Our appreciation is extended to Environment Canada for their exceptional efforts in having this workbook produced. A special acknowledgement is also extended to the Canadian Centre for Pollution Prevention and to Dr. Robert Pojasek for their wealth of knowledge and their contributions to this document.

We encourage businesses to produce copies of the Workbook as a reference for their pollution prevention efforts and to educate employees. The content of the Workbook is not to be altered without permission from the sponsoring agencies. The Workbook is designed to be updated and amended on a periodic basis. Check the Nova Scotia Environment and Labour website (www.gov.ns.ca/enla) to determine if you have the most recent edition.

February 2003

Efficient Energy Use in Your Business
Module 7

This module includes:
- *Kick-Off Quiz*
- *Gathering Key Pieces of Information*
- *Primer: What are the Greenhouse Effect and Climate Change?*
- *Environmental Legislation*
- *Checklists: Assessing Opportunities and Best Practices for Your Business*
- *Tools and Tips for Business: Programs and Initiatives*
- *References and Resources*
- *Opportunities Action Table*
- *Success Stories and Case Studies (throughout)*

7.1 Introduction

Energy is an important input to all commercial and industrial operations. For most businesses, it represents a significant expense. The generation of energy is largely fuelled by burning non-renewable resources, namely coal, oil and natural gas. Although there are still large quantities of coal on the planet and new reserves of oil and gas are being discovered, such as those on the Scotian Shelf, global demand is rising rapidly. Conserving these resources is a prudent thing to do.

Despite our proximity to the offshore oil and gas reserves, Nova Scotia still remains dependent on foreign reserves of oil, coal and gas to heat and power the majority of our homes, businesses, and vehicles. This dependency makes us vulnerable to fluctuating prices and supply related to a variety of global conditions and conflicts. Recently, the uncertainties in the oil supply have contributed to a roller-coaster ride for oil prices in the province. This can affect power rates as well.

Burning hydrocarbons such as coal, oil and natural gas, produces carbon dioxide as the carbon in the fuel combines with oxygen. Carbon dioxide is the most abundant greenhouse gas (after water vapour). While the greenhouse effect is a natural phenomenon, and vital to all forms of life, including humans, to exist on Earth, many scientists believe that increasing concentrations of carbon dioxide and other greenhouse gases are causing significant changes in the earth's climate. This includes shifting weather patterns, increased frequency of extreme weather conditions, and melting ice caps, which contributes to the rising sea levels. The outcome of climate change is not readily predictable, but the risks are high.

To combat climate change and uncertain energy supplies, businesses must become more efficient in their energy use, and look to renewable sources of energy to form part of their overall energy programs. Fortunately, there are many opportunities to conserve energy and use its various forms more efficiently. For businesses, these opportunities have many benefits such as:
- Lowering energy costs.
- Improving the bottom line.
- Increasing productivity.
- Helping a business achieve compliance.
- Showing environmental responsibility.
- Reducing future financial uncertainty resulting from fluctuating energy costs.

Success Stories

Interested in energy related success stories for small businesses? Try the US EPA Energy Star -Small Business website at www.epa.gov/smallbiz/ss.html) for these stories:

- *An autobody shop saves over $5,500 annually by upgrading their lighting and using common sense savings.*
- *A bookstore saves $4,800 annually by upgrading their lighting and installing energy efficient window.*
- *A fast food franchise saves up to 20,000 annually by replacing their lighting and using energy efficient air conditioning, keeping their customers comfortable.*
- *A bed and breakfast saves over 10,000 annually through renovation and installation of energy efficient heating systems.*
- *A grocery store saves over $38,000 annually by upgrading their lighting and using energy efficient freezers.*

Using energy efficiently through pollution prevention practices can have many benefits to a community including:

- Decreasing greenhouse gas and combustion emissions, contributing to a healthier environment.
- Helping achieve local, regional and national targets for emissions reductions.
- Reducing demands to build bigger and more power generating facilities.
- Reducing air pollution and health risks.

Whatever your incentive, saving energy in your business is a smart decision and makes good business sense. By using a pollution prevention approach in your company, you can eliminate pollution and inefficiencies, and improve the bottom line.

This module, "Efficient Energy Use in Your Business" will provide your business with practical information, ideas, tools, and resources on how to increase energy-efficiency by focusing on preventing pollution and on resource conservation.

7.2 Kick-Off Quiz

Before starting this section, take our Kick-Off Quiz to see how your company currently rates in energy efficiency and conservation. Scoring works as follows: no = 0 points, somewhat = 1 point, and yes = 2 points. Write your score in the blank provided at the end of each question.

1. Do you know the breakdown (rough percentages) of energy use in your company, for example: lighting, heating, process? (*Understanding how you use energy in your organization will help you to develop the most cost effective program.)* ________
2. Do you know what your energy costs are on a monthly basis? *(By understanding how much you spend on energy, you can better appreciate the economic benefits to reducing energy use.)* ________
3. Are you already undertaking some low-risk, high-return actions that are relatively simple for your business (example: turning off lights and equipment when they are not in use)? (*Many practices just make good business sense to implement. They are often low cost/no cost methods to lower your energy costs.)* ________
4. Do you effectively maintain your building - by improving insulation around ceilings, floors, walls, weather-stripping, caulking, replacing door seals? *(A properly maintained building will lower heating costs, reduce energy use and create a more comfortable work environment.)* ________
5. Have you implemented any lighting upgrades in your facility? *(Operating under an outdated lighting system can be one of the most inefficient practices in your business. This is one of the first areas to examine for potential savings. The "Light Better for Less" website, listed in the resource section of this module, can help get you started.)* ________

Total Score: ________

If you scored between 8-10, good work! Keep it up!
Between 4-7, you are not doing too badly but could likely improve and reduce your company's environmental impacts.
Between 0-3, you need help, but there's lots of assistance available. Read on!

Did you know? *In Canada, industry consumes more than one third of all the energy used in the country.*[1]

Clean Nova Scotia is a non-governmental environmental organization that provides information to all Nova Scotians on environmental issues. They have a Climate Change Centre that focuses on encouraging Nova Scotians to take action to reduce greenhouse gas emissions. Check out their website for a review of how the major industrial sectors in Nova Scotia are likely to be affected by climate change and how they can adapt. http://www.clean.ns.ca

7.3 Gathering Key Pieces of Information

There is some baseline information that will be useful to have on-hand as you work through the various modules of the Workbook. By compiling your company's data on energy usage and costs, you better understand your current performance and can identify possible problem areas, and areas for targeting pollution prevention efforts. Baseline data also provides a reference point for monitoring progress and savings, and allows you to compare your performance against industry standards. In this section of the module, record the key pieces of information. Some of this information may be readily available through regular billing from utility providers. Information may be available from previous surveys or audits. A facility walk-through and a discussion with key staff will uncover some of the information. You will need to estimate some figures. You probably have access to weekly and monthly information - by converting to annual figures, a better appreciation of the scale of current costs and inefficiencies can be gained, along with the savings that can be achieved.

Energy Data

Energy Type *	Where Energy Used	Amount Used (Annually)	Cost (Annually)
	Total Energy Used:		

*Include all the types of energy used/purchased: electricity, fuel oils, coal, propane, steam

7.4 Primer: What are the Greenhouse Effect and Climate Change?

The temperature on earth is, in part, regulated by a system known as the "greenhouse effect." This natural phenomenon is caused by the presence of water vapour and other gases in the atmosphere, which "trap" the sun's heat as it is retransmitted to space. This natural system is an important part of life on earth, and without it, the average temperature of the earth would be much lower. Current average temperature is 15 degrees Celcius. Without the "greenhouse effect" the temperature would be -18 degrees.

As fossil fuels are mined and consumed for energy the concentrations of most of greenhouse gases are increasing in the atmosphere. A consensus of scientific expertise has concluded that "emissions of carbon dioxide due to fossil-fuel burning are virtually certain to be the dominant influence on atmospheric concentrations during the 21st century and that increased concentrations of greenhouse gases will enhance the "greenhouse effect"[2]. Potential changes to the earth's climate will include shifts in rainfall and weather patterns, increased sea level, risks to wildlife and humans, and altered growing seasons.

What will Climate Change mean to me?
Here are the predicted impacts for Nova Scotia:
Sea Level Rise:
- Increase in coastal flooding and erosion.
- Changes in coastal wetlands.

Precipitation Changes:
- Greater percentage of rainfall in single events.
- Earlier and higher river flooding.
- Lower summer river flows with low flow periods starting earlier.
- Agriculture:
- Increased flooding of land protected by dykes.
- More diverse and less predictable weather with more disease, changes in crop selection and new challenges for water management.

Forestry:
- Added stress from changes in temperature and precipitation.
- More damaging and costly insect infections.
- Changes in growth rates and dieback and number and severity of forest fires.

Fishery:
- Some fish species decline or move, others prosper and new species appear.

What is Global Warming? *Global warming was the term that was previously used to describe changing weather patterns created by increasing greenhouse gas emissions. In fact, global warming is one type of climate change, but increasing temperatures will lead to changes in other aspects of the Earth's climate, which may disrupt weather patterns around the world. The term climate change more accurately describes the situation and is in common use today.*

Examples of greenhouse gases:
- ***Carbon Dioxide*** *- largely due to burning of fossil fuels such as coal, natural gas and oil for electricity, transportation, and heating.*
- ***Nitrous Oxides*** *- emissions from fossil fuel burning, vehicle emissions and nitrogen fertilizers.*
- ***Methane*** *- Principal component of natural gas. Also a by-product of the bacterial breakdown of organic matter in swamps, rice paddies, ruminants (cows, sheep, etc), and waste dumps as well as other sources.*
- ***CFC's*** *(chlorofluorocarbons) - used in older fridges and air-conditioners, some solvents, and halons in fire extinguishers.*

Did you know? *Secondary energy use is estimated to cause 60-65% of the greenhouse gases emissions, and is the largest source in Canada. (Primary energy use is that associated with the generation of power itself; that is, thermal electric, nuclear power plants, gas turbines, etc.) The industrial /commercial sector accounts for 39% of this secondary use with the transportation next at 30%.*[1]

- Communities, business and individuals need assistance to respond to changes in stocks.

Other potential impacts include:

- Changes in ice-free days, increased intensity of tropical cyclones (higher winds and heavier precipitation), both of which could affect marine transportation and the offshore oil and gas industry.
- Changes in range, distribution and breeding success rates of seabirds.

(From Canada Country Study www.ec.gc.ca/climate/ccs/ccs_e.htm and IPCC Third Assessment Report, 2001)

Did you know? *While Nova Scotians can be considered among the world's top emitters of greenhouse gases at approximately 19.8 tonnes of carbon dioxide per person per year, overall, we produce a relatively small percentage of greenhouse gasses (3.5% of Canadian emissions)*[1, 3]

What is Energy Efficiency?

One response to combating climate change is increasing energy efficiency. Energy efficiency, similar to efficiency in other areas, is a measure of how effectively we use the energy we generate. Simply put, it compares the output of work/energy from an activity to the energy we put into the activity. For example, the current most efficient gas combustion engine has an efficiency of about 40%; that is for every joule of energy consumed, about 0.4 joules of energy is produced, in this case the energy to actually move the vehicle!

What is "Green Power"

A second basic response to combating climate change is energy substitution - using renewable energy sources or "green power". Renewable energy can help reduce emissions from Canada's electricity sector. Wind power, solar power, hydro-electricity and earth and biomass energy can all produce electricity without depleting our natural resources. "Green Power" projects also reduce our dependence on imported energy and create business opportunities.

Nova Scotia has a number of examples of small-scale projects using renewable sources: The Annapolis Tidal Generating Station has been in operation since 1984. Heat pump systems are utilizing warm mine water from abandoned coal-mines as a source of heat (geothermal energy). Many homes and commercial buildings have incorporated solar technologies/practices into their design and construction. And, there are examples of large industrial facilities that use wood and/or wood waste to generate electricity or produce heat. Nova Scotia is also strategically located to develop and take advantage of wind power.

Currently in Nova Scotia about 10% of the electricity that Nova Scotia Power Inc. (NSPI) produces comes from renewable hydroelectric energy sources. NSPI has launched a wind energy initiative, having purchased two 670 kW wind turbines to supply power to about 400 homes.[4]

Nova Scotia Success Story: *Quinpool Towers, Halifax, NS*

For the past 15 years, Quinpool Towers - an apartment building in central Halifax, has been harnessing the sun to meet 20% of its domestic hot water requirements. This is accomplished with the help of 100 roof top solar panels measuring 228 square metres. The original installation costs were offset by a federal solar energy grant. Environment Canada is currently working with the apartment owners to try to increase the solar fraction from 20% to 70% by improving the storage capacity. Hot water from the solar system is presently stored in a series of water tanks. The idea is to leave the tanks in place as a short term buffer storage and to use an in-ground bore-hole storage system for long term or seasonal storage. In the pilot and testing stage, four bore-holes will be drilled and connected together with heat exchange tubes. The storage capacity for excess heat will increase from 7,500 litres to more than 50,000 litres.

How can renewable energy affect my business?
Examine your operations for opportunities to incorporate renewables technologies. Particularly if you are planning to upgrade, look at the financial and environmental impacts of including an alternative energy source in your energy program. Talk to companies that are using renewable energy for ideas.

7.5 Environmental Legislation

Energy use is not regulated in Nova Scotia, except for specific restrictions on combustion of used oil, and other waste products. There may also be municipal by-laws that apply.

Under the Nova Scotia Environment Act it is an offence to release a substance into the environment that may cause a significant adverse effect (impairing or damaging the environment).

If you want to install an alternative energy system, you need to contact your provincial and municipal agencies to determine if approvals are required. For information on approvals, contact your local municipal and the Department of Environment and Labour offices (see Module Eight for contacts).

7.6 Standards and Policy Guidelines

__Did you know?__ Certain products must meet federal energy-efficiency standards? You can find out about these regulations at http://oee.nrcan.gc.ca/regulations/home_page.cfm

The pressure on business to improve energy efficiency will continue to increase in the near future in response to governments' commitments and public pressure to address climate change. In December, 2002, Canada officially ratified the Kyoto Protocol. We now join 95 other countries that have ratified the international treaty, including all of the European Union members, New Zealand and Japan. Canada produces 3% of the world's emissions. Under Kyoto, we are committed to cutting average annual greenhouse gas emissions to 6% below 1990 levels by 2012. For Nova Scotia, this means cutting projected emissions by over 3 million tonnes from the projected 2010 level.

The financial impact of ratifying Kyoto continues to be debated by industry, governments, and the general public. However, the federal government has indicated that the process of implementation will begin immediately in order to meet our obligations of the pact.

The federal government released the Climate Change Plan for Canada in the fall of 2002. This document lays out the framework for Canada to address climate change and meet international obligations, as well as enhance our competitiveness and improve the quality of life for Canadians. To view the report, visit http://climatechange.gc.ca/plan_for_canada/index.html

The Climate Change Voluntary Challenge and Registry Program (VCR) was launched in 1995 through Natural Resources Canada but is now a non-governmental program. Members of this program are encouraged to develop and implement plans to reduce their greenhouse gas emissions (over 700 organizations are now registered with the VCR).

For more information on the VCR, visit www.vcr-mvr.ca/.

For more information on the Partners for Climate Protection Program, visit http://www.fcm.ca/scep/support/PCP/pcp_index.htm

At the municipal level, 92 Canadian municipalities (two from Nova Scotia - Halifax and New Glasgow) are members of the Partners for Climate Protection (PCP) organized by the Federation of Canadian Municipalities and the International Council for Local Environmental Initiatives (ICLEI). Participating municipalities agree to reduce local greenhouse gas emissions.

Nova Scotia Success Story - King Metal Fabricators, Dartmouth, NS

King Metal Fabricators (King) specializes in structural and ornamental metal products and prefabricated metal building components. It developed the first double wall tank system in North America specifically dedicated to the safe interim storage of used/waste oils and other hazardous water petroleum products.

In 1997, King expanded its plant to meet growing requirements for increased production capacity. King bought and transformed an old rundown warehouse into a site of modern, dynamic, successful, and environmentally friendly business. King, in its redevelopment of the old warehouse, installed a solar wall ventilating system. This double walled system transfers solar heat energy collected by the outer perforated wall to air drawn through the perforations into the cavity between the walls. This air is then circulated through the plant, serving both ventilation and heating purposes. The incoming air, the exhaust air, boilers and after-coolers are all controlled by a "Smart Building" computer control program. The layout of the plant operation was designed to match the airflow to the workflow, i.e. introducing clean, warm air at the final assembly line, and exhausting stale air at the welding and cutting lines. The residual heat generated by the compressor system and the heated air from the paint room during drying cycles are also captured and redirected to the plant, further reducing energy consumption.

Environmental Benefits:
- By buying an existing property and renovating it (reuse), King placed less demand on the environment for new resources.
- Reduced energy consumption due to a solar ventilating system, the reuse of residual heat from compressor system and the paint room, and matching airflow to workflow

Economic Benefits:
- Heating and ventilating savings of approximately $15,000/year.
- The total cost for environmental control (including solvent recycling and changes to the sandblasting operation) was under $300,000. After three years of operation, hard cash savings are around $45,000 per year, which meets King's expectations for return on these capital expenditures.

Social Benefits:
- Improved the appearance of the community by transforming an old warehouse into a valuable and aesthetically pleasing facility.

For more information contact:
King Metal Fabricators Ltd.
219 Waverley Road
Dartmouth, NS B2X 2C3

Did you know? *Motor-driven equipment accounts for 64% of the electricity consumed by U.S. industries. Energy-efficient motors can cut this energy use by at least 12%.*[5]

7.7 Checklists: Assessing Opportunities and Best Practices for Your Business

For businesses, there are many opportunities for improving energy efficiency. Measures taken may be more expensive on the short-term, but will reap rewards in the long term. This section includes a series of checklists to assess the four main areas in a typical business where opportunities may be identified. These are heating and cooling, processes, lighting, and transportation of goods and people. The checklists will help you to determine some pollution prevention opportunities, but keep in mind that they are a starting point for your company. Watch for other opportunities that will be specific to your particular business.

A. Checklist – General

	Yes	No	Don't Know	Not Applicable
Do you know what each of the charges on your energy bill is for?				
Have you educated and involved employees in energy efficiency efforts?				
Are there strategically located signs reminding employees/customers to use energy wisely and to turn off equipment and lights when not in use?				
Do computers and photocopiers have stand-by modes to reduce energy consumption?				
Do you use timers, motion sensors or other devices to reduce heat and light in areas when these are not being used?				
Do you schedule your electrical loads to avoid operating equipment or devices with high electrical demands simultaneously?				

B. Checklist – Lighting				
	Yes	**No**	**Don't Know**	**Not Applicable**
Have fluorescent bulbs been substituted for incandescent bulbs?				
Have the most efficient fluorescent bulbs and efficient ballasts been installed? *If you don't know, you may need to consult a lighting specialist.*				
Is the lighting system appropriate to the activities of the employees? *Avoid over-lighting areas, use smaller task lights in specific areas. If employees aren't comfortable, they'll modify their space (e.g., bring in less efficient lamps from home) and inadvertently increase energy use.*				
Are you making the most effective use of daylight?				
Have local switches been installed so that a single switch does not control all fixtures in a multiple work space area? *Make sure to label switches.*				
Have motion sensors or timers been installed where appropriate to control lighting?				
Are lights normally switched off after work or when employees leave rooms?				
Are light fixtures cleaned on a regular basis? *Dirt and dust accumulation can reduce light output by up to 30%.*				
Are the walls of your facility clean and painted with light reflective, non-glossy colours? *Replace dark carpet with light colour carpets.*				
Has a lighting audit been conducted to identify all possible energy savings?				

C. Checklist - Heating and Cooling

	Yes	**No**	**Don't Know**	**Not Applicable**
Have temperature settings been adjusted to ensure minimum energy use for a given comfort level?				
Can heating or cooling be controlled by room or zone through thermostats?				
Are thermostats on timers?				
Is access to thermostats limited?				
Have responsibilities been assigned to ensure HVAC systems are properly shut down/off at the end of the day and on weekends?				
Are your heating and cooling systems maintained regularly? *Replace old equipment with newer, more efficient models.*				
Are unused or storage areas sealed off? *Limit heating and cooling in these areas.*				
Do you have enclosed vestibules, entries or revolving doors so staff and customers do not exit directly to the outside?				
Do you keep industrial loading doors closed during the heating season?				
When industrial loading doors are open during the heating season, do you minimize heat loss through using plastic heat retaining strips or hoods?				
Have refrigerators and freezers been placed in locations that avoid exposure to heat?				
Are heat exchangers for air or water used to reduce energy consumption?				
If the upper level of the building is warmer than lower levels, are fans installed to push warm air down to lower areas?				
Is the building adequately insulated? *Improve insulation - ceilings, floors, walls, weather-stripping, caulking, door seals, and replace broken or cracked windows.*				

Are windows double or triple glazed ones? *Upgrade to high efficiency windows.*				
Have blinds, reflective glass or coatings been installed on east, west and south facing windows? *This will minimize heating by sunlight and reduce cooling load in summer. Adjustable blinds can be opened to maximize the use of natural light in winter.*				
Have trees and bushes been planted on the property to provide shade in the summer and windbreaks in the winter?				
Are localized fume hoods installed to exhaust dust or fumes from processes rather than ventilating the entire area?				
Are pipes insulated to reduce heat loss or gain?				
Are any of your neighbours discharging waste heat or cold that could be captured for your use? (Conversely, do you have any waste heat that could be marketed?)				

D. Checklist – Process

	Yes	**No**	**Don't Know**	**Not Applicable**
Is all process equipment cleaned and maintained regularly?				
If compressed air is generated, are air leaks in tanks promptly fixed? *Leaks result in unnecessary running of equipment and energy consumption.*				
Is the air compressor shut off when not in use?				
When running the air compressor, is the appropriate pressure level used for the job? *Excessive pressure results in increased energy use.*				
Are all pipes carrying hot or cold liquids insulated?				
Are heated or cooled storage tanks properly insulated?				
Are any holes in steam lines and steam traps maintained promptly? *Leaks result in energy loss and loss of material.*				
Is waste heat recovered from processes using heat exchangers?				

Is steam produced at a higher temperature and pressure than necessary?				
Can the hot water temperature be reduced? *Add a timer to your hot water tank; use cold water instead of hot where possible.*				
Are all motors appropriately sized for the process? *Using oversized equipment may not be the most efficient use of energy.*				
Have variable speed motors been substituted for fixed speed motors?				
Can waste material such as wood chips and sawdust be burned for heating purposes? *If you are considering doing this, contact provincial and municipal regulators since some materials are not acceptable.*				
When buying equipment, do you check the power ratings, purchase machines with low-energy-options, and set up a servicing contract with supplier to keep the machine running efficiently?				

E. Checklist – Transportation				
	Yes	**No**	**Don't Know**	**Not Applicable**
Do you always select the right vehicle for the task?				
Is fuel efficiency a major factor in deciding on vehicle purchases?				
Is route planning and delivery scheduling done to reduce the number of trips needed and improve efficiency?				
Are drivers trained and monitored to drive with fuel efficiency in mind? *Speeding can use up to 25% more fuel than driving at the limit.*				
Does each vehicle have an activity and service log?				
Are vehicles serviced regularly? *Poorly maintained vehicles can produce up to 50 % more emissions. Ensure tires are properly inflated and wheels aligned.*				
Are speed control devices installed on your vehicles?				

Are aerodynamic devices installed on your company's vehicles?				
Are alternative fuels used in your vehicles?				
Is vehicle idling discouraged or eliminated by means such as installing shut off devices? *30 seconds is usually all that is required to heat an engine on cold days. Ten seconds of idling uses more fuel than restarting an engine.*				
Do you encourage employees to use public transportation?				
Do you provide support for employees that bike to work? *Provide showers and a changing area. Pay a bicycle mileage allowance. Provide secure parking facilities for bikes.*				

My Electricity Bill is Still High? Why?
If you've reduced the amount of energy that your company uses and the electricity bill is still high, have a closer look at your electricity bill. You may have noted that as a business, you pay not only for the total amount of energy that your business uses, but you also pay something called a ***demand charge.*** *Since electrical energy can't be stored on a large scale, power companies must have the capacity to supply the demand of all customers at any given time during the day and over any season of the year - essentially to be on stand-by. To recover the costs of equipment - transformers, wires, substations - which they've invested in to meet customer requirements, power companies apply demand charges to their industrial and commercial users. The peak demand charge on your bill is the highest rate of consumption (demand) your facility has had over a specific period of time. This peak only has to occur once during the billing period for full demand (and demand charges) to be in effect. Peak demand charges typically account for 30% of a commercial or industrial user's energy bill.*

In going through this checklist, did you identify some potential opportunities? Keep a record of the low-cost/no-cost practices in the Energy Opportunities Action Table for follow-up. The Table is provided on the final page of this module. If you have identified options that are more complex or require potentially capital intensive, they will require additional in-depth investigation on your part. Use the Feasibility Assessment Checklist provided in Appendix B to help determine economic and technical feasibility, and potential environmental impact. Always remember that requirements legislated by municipal, provincial and federal authorities must be priorities and should not be assessed for feasibility.

7.8 Tools and Tips for Business: Programs and Initiatives

The Nova Scotia Department of Natural Resources has an *Energy Management and Utilization* section. If you are looking for information on energy efficiency, alternative energy solutions and sustainable energy development issues, contact department staff at 1-800-670-4636 or visit the website at http://www.gov.ns.ca/natr/energy/

One program for business that the Department of Natural Resources has supported, along with a number of other organizations, is *Light Better for Less!* It was formed to demonstrate the benefits of energy-efficient lighting to business. The program provides information on the financial benefits of improving lighting efficiency. For more information on the "Light Better for Less" program, go to http://www.gov.ns.ca/natr/energy/lb4l/

Nova Scotia Power provides advice and energy saving information to businesses. For information on their programs, check out their website at http://www.nspower.ca/YourBusiness/index.html or contact them at 1-800-428-6230 (in Metro Halifax, call 428-6230)

The *Office of Energy Efficiency of Natural Resources Canada (NRCan)* is the lead federal agency when it comes to information, programs and technology for industry/business about climate change and energy issues. Check out some of these programs to help in your company.

- Interested in products and services to help plan, finance, and implement comprehensive energy-efficiency improvements? Try joining the *Industrial Energy Innovators Initiative (EII)* program (http://oee.nrcan.gc.ca/cipec/ieep/iei/index.cfm). Another program offered through NRCan is the *Canadian Industry Program for Energy Conservation (CIPEC)* which is a partnership between government and a broad range of industrial associations and groups. Members of these sectors receive a variety of services to help them develop energy-efficiency goals and action plans (http://www.oee.nrcan.gc.ca/cipec/ieep)
- Looking for information on financial incentives? Two programs that are available through NRCan are the *Commercial Building Incentive Program (CBIP)* (up to $60,000) for incorporating energy efficiency technologies and practices in designs of new commercial/institutional building designs (http://cbip.nrcan.gc.ca/cbip.htm) and the *Industrial Building Incentive Program (IBIP).* This program encourages energy efficiency in the designs of new industrial buildings by fostering the integration of industrial building design and process design (up to $80,000 is available to Industrial Innovators that are building new industrial buildings) (http://cbip.nrcan.gc.ca/ibip.cfm)
- Need information on purchasing motors, pumps, transformers, compressors, boilers or lighting products? Check out the *EnerGuide for Industry* - a guide to help companies make the right choices. (http://www.energuide.nrcan.gc.ca)
- If you are interested in improving efficiencies and reducing costs in your fleet of vehicles, try the *FleetSmart* program. (http://www.fleetsmart.nrcan.gc.ca/home_e.cfm)
- Looking to reduce vehicle idling throughout your company? Visit the *Anti-Idling Website* that includes tools like calculators, posters, along with information to use with your employees (http://oee1.nrcan.gc.ca:80/idling/home.cfm)

A good understanding of when and how you consume electricity in your business can help you better manage your demand and spend less on electricity. In the bigger picture, this will contribute to a cleaner environment by reducing demands on power companies to build bigger and more power generating facilities. A better understanding begins by creating a load or demand profile (reading your demand meter and recording the demand number registered, plotting the numbers on a graph, and record the events and equipment operating at the time of your peaks) and then looking for opportunities to reduce your peak demand. Consider the following ideas:

- *Can daily start-up of equipment be coordinated to avoid surges in power consumption?*
- *Can some equipment be turned off for a few hours without causing a loss of production, inconvenience or harm (air conditioners, storage room heating, and storage water heaters)?*
- *Can timers be installed to provide automatic scheduling?*
- *Can an alarm be installed that is triggered when demand reaches a predetermined peak?*
- *In some settings, emergency generators may be practical for peak load shedding.*

Consider consulting a professional to help you assess your opportunities.

From: Nova Scotia Power - What is Demand Billing? http://www.nspower.ca/YourBusiness/AboutBillingAndPayment/UnderstandingDemandMeter/ and New York State Electric & Gas Corporation's - Understanding Electric Demand: http://www.nyseg.com/nysegweb/online.nsf/doc/ued/$file/elecdmnd.pdf

Did you know? *Twenty pounds of carbon dioxide are emitted by a car for every gallon of gasoline it consumes.*

For more energy success stories, visit the CIPEC website at http://www.oee.nrcan.gc.ca/cipec/ieep/newscentre/guides.cfm. Since 1998, CIPEC has featured more than 50 companies that embrace energy efficiency innovation and, through their unique vision and perspective, inspire others to advance energy efficiency programs. Some of the latest companies featured include Michelin North America (Canada) Inc., Midwest Food Products Inc. Schneider Foods, and St. Lawrence Cement Inc.

- Looking to purchase a vehicle? NRCan produces "*Fuel Consumption Guides*" that lists fuel consumption ratings for cars, vans, light-duty trucks and sport utility vehicles based on model year. Use these listings to compare vehicles. Check out the online version of this guide at http://oee1.nrcan.gc.ca:80/autosmart/fcg/index.cfm along with other information on buying, driving and maintaining vehicles.

Final Word - Keep up-to-date!

An energy-efficiency program is dynamic, and will need to be reviewed periodically and updated. With growing environmental concerns, new technologies and rising energy costs, new opportunities to conserve energy will continue to emerge. Keep records of your efforts and the benefits realized as an incentive to continue your programs, and help identify future opportunities. One success will lead to another within your office, and this may also spur other offices to implement energy conscious programs.

Canadian Success Story: Greenhouse Gas Reductions at Dana Canada, Thorold, Ontario

The Canadian Council of Ministers of the Environment (CCME) supports the growing emphasis on pollution prevention, knowing it is more effective to minimize or avoid creating pollutants and waste at the source than to clean them up or treat them after they have been produced. CCME offers an awards program recognizing companies and organizations showing leadership in pollution prevention.

In 2001, Dana Canada's Thorold Frame Plant based in Thorold, Ontario was awarded CCME's Pollution Prevention Award in the greenhouse gas reduction category, presented to organizations that achieve significant reductions in greenhouse gas emissions through pollution prevention activities. The ISO 14001 certified Thorold facility has 800 employees that are responsible for manufacturing automotive components and assemblies for light vehicle structures. Employees undertook a project to discover an alternative draw compound, which acts as a lubricant and assists in metal stamping functions, and parts washing soap which would address health, safety, and environmental concerns expressed within the plant.

Reformulation of a combined draw compound and parts washing soap has resulted in reductions in employee skin irritation, water consumption and wastewater treatment, and energy consumption. The temperature of the parts washer water has been reduced, with annual savings of more than $20,000 in energy costs and a 28% reduction in greenhouse gas emissions.

From: The Canadian Council of Ministers of the Environment (CCME) website:
(http://www.ccme.ca/5e_othertopics/5ed_pollution/P2/5ed1a.html)

7.9 References & Resources

References

[1] Jacques, A.P., F. Neitzert, and P. Boileau. 1997. Trends in Canada's Greenhouse Gas Emissions 1990-1995. Environment Canada.

[2] Watson, R.T. and the Core Writing Team (Eds.), Intergovernmental Panel on Climate Change (IPCC). 2001. Third Assessment Report: Climate Change 2001. IPCC, Geneva, Switzerland.

[3] Hughes, L. 2001. Greenhouse Gas Emissions and the Nova Scotia Energy Strategy.

[4] Nova Scotia Power Inc. Website. 2002. http://www.nspower.ca/GreenPower/faq.shtml#11.

[5] Office of Industrial Technologies (US Department of Energy – Office of Energy Efficiency and Renewable Energy) http://www.oit.doe.gov/bestpractices/motors/

Resources

Guides/Checklists/Fact Sheets/Publications
Alliance to Save Energy. Business Energy Checkup. http://www.ase.org/checkup/business/

Centre for Energy and Climate Solutions. Energy Efficiency Opportunities: Big Box Retail and Supermarkets. http://www.cool-companies.org

Eco-Efficiency Centre. Dartmouth, Nova Scotia. Fact Sheet on Responsible Energy Use. http://www.dal.ca/eco-burnside

Environmental Technology Best Practice Programme. 2000. Green Officiency: Running a cost effective, environmentally aware office. http://www.envirowise.gov.uk/

Government of Nova Scotia. 2001. Seizing the Opportunity: Nova Scotia's Energy Strategy.

International Centre for Local Environmental Initiatives. 1993. Profiting from Energy Efficiency: A Handbook for Municipalities.

Michigan Manufacturing Technology Center. Manufacturing Assessment Planner (MAP) Toolkit - General Energy http://map.mmtc.org/

Natural Resources Canada. 1998. Smart Driver Program for Heavy Vehicles: Instructor's Guide.

Natural Resources Canada. 2000. Fleet Smart Tool-Kit.

Natural Resource Canada. 2001. Spot the Energy Savings Opportunities Guidebook.

Natural Resources Canada. Energy Efficiency Guides:
http://www.oee.nrcan.gc.ca/cipec/ieep/newscentre/guides.cfm

- Energy Efficiency in Aluminum Smelters
- Energy Efficiency Opportunities in the Dairy Processing Industry
- Energy Efficiency Opportunities in the Solid Wood Industries
  Energy Efficiency Opportunities in the Canadian Brewing Industry
- Energy Efficiency Opportunities in the Canadian Rubber Industry
- Energy Savings Opportunities in the Kraft Pulp Industry
- Energy Conservation and Efficiency Guide for the Lime Sector

Ontario Clean Air Alliance, Emissions Calculator
http://www.electricitychoices.org/calculate.html

Research Triangle Institute. 1998. Pollution Prevention (P2) Measurement Tools Resource Guide, http://clean.rti.org/resguide/

Southface Energy Institute http://www.southface.org/home/sfpubs/miscpubs.html. A series of 30 Technical Bulletins covering energy-related issues, including the following: Choosing Heating and Cooling Equipment, Air Conditioner Tips, Sustainable Building Resources, Insulation Basics, Compact Fluorescents - save money and prevent pollution, Window Primer, Save Water and Energy, and Energy Checklist- Energy Efficient Construction

The New Environmentalist Magazine – Online Calculators
http://www.thenewenvironmentalist.com/

United Kingdom Institute for Business Ethics. 1994. Benefiting Business and the Environment: Case Studies of Lost Savings. London.

United Kingdom Department of the Environment. 1992. Practical Energy Saving Guide for Smaller Businesses. London.

United Nations Environment Programme's Division of Technology, Industry and Environment (UNEP DTIE) and the Wuppertal Institute for Climate, Environment and Energy. Efficient Entrepreneur: A Calendar for Small and Medium-Sized Enterprises. http://www.efficient-entrepreneur.net/index2.html

US Department of Energy – Office of Energy Efficiency and Renewable Energy, Federal Energy Management Program. Buying Energy Efficiency Products. http://www.eren.doe.gov/femp/procurement/

Websites
Action Energy (formerly the Energy Efficiency Best Practice Programme) http://www.actionenergy.org.uk/

Canadian Centre for Pollution Prevention
http://www.c2p2online.com

EnergyIdeeas.com http://www.energyideas.org/

Energy Efficient Building Association http://www.eeba.org

Environment Canada http://www.ec.gc.ca/climate/home-e.html

Government of Canada Climate Change
http://climatechange.gc.ca/english/index.shtml

Intergovernmental Panel of Climate Change http://www.ipcc.ch/

Meteorological Service of Canada (Climate Change information)
http://www.msc-smc.ec.gc.ca/your_environment_e.html

Natural Resources Canada, Office of Energy Efficiency,
http://oee.nrcan.gc.ca/

Nova Scotia Department of Energy
http://www.gov.ns.ca/energy/

Nova Scotia Department of Natural Resources
http://www.gov.ns.ca/natr/energy/

Nova Scotia Power http://www.nspower.ca/YourBusiness/

Partners for Climate Protection Program
http://www.fcm.ca/scep/support/PCP/pcp_index.htm

US Department of Energy (Business)
http://www.energy.gov/business/

US Department of Energy Office of Energy Efficiency and Renewable Energy http://www.eren.doe.gov/

US EPA Energy Star for Small Business
http://www.epa.gov/smallbiz

US EPA Global Warming Site (Business)
http://yosemite.epa.gov/oar/globalwarming.nsf/content/VisitorCenterSmallBusiness.html

US EPA Global Warming – Actions: Waste (Business)
http://yosemite.epa.gov/OAR/globalwarming.nsf/content/ActionsIndustry.html

Energy Pollution Prevention Opportunities Action Table					**Module 7**		
Pollution Prevention Practice or work tasks required to achieve a goal	**Responsible Individual**	**Efficiency or Reduction Goal**	**Resources Required**	**Start Date**	**Completion Date**	**Results (reduction or efficiency achieved)**	**Savings Achieved**
Example: *Meet with cleaning staff about scheduling of regular cleaning of light fixtures in plant.*	*Jane Doe, Maintenance Representative*	*Improve lighting efficiency*	*Time (x# of hours)*	*June 1*	*June 10*		

Module 8 – A Directory of Contacts for Business

Introduction

Pollution and waste costs your business money and impacts the environment. By preventing pollution the environment is better protected and typically business liabilities are reduced, while productivity and competitiveness are enhanced.

Pollution Prevention (or P2 as it is sometimes called) is an approach that any size or type of organization can apply to both protect the environment and save money. In its simplest explanation, it is captured by the familiar saying, "an ounce of prevention is worth a pound of cure". If a company doesn't create pollution or waste, it doesn't have to devote time and resources to storing, handling, transporting, treating or disposing of it. Pollution prevention includes conserving water and energy, "green" purchasing, efficient use of raw materials, replacing hazardous products with less hazardous ones, and modifying processes to reduce waste and pollution.

This "Pollution Prevention Workbook for Business in Nova Scotia" has been designed to introduce small and medium-sized businesses to pollution prevention and assist them in making pollution prevention part of their day-to-day decision making - in effect, to help companies realize that pollution prevention efforts simply make "good business sense"!

The "Pollution Prevention Workbook for Business in Nova Scotia" contains seven modules and a directory of contacts. A business can use the entire workbook or can use individual modules one at a time. The series of modules include:

Introduction to Pollution Prevention
Getting Started with Pollution Prevention
Minimizing Risk in your Business: Pollution Prevention & Risk Management
Pollution Prevention, Water and Wastewater in your Business
Eliminating and Reducing Chemicals in your Business
Solid Waste Reduction and Resource Recovery in your Business
Efficient Energy Use in your Business

"Notice to User"

This manual is intended to provide information on the benefits of pollution prevention for businesses in Nova Scotia. It also provides information on some of the relevant laws in effect in Nova Scotia as of the date of publication. It is not intended to provide information on how to comply with all provisions of those laws which may apply to businesses.

This manual is not intended to contain a complete statement of the law in the area of pollution prevention or the environment. This manual does not replace reading the legislation and regulations. Amendments may be made to the legislation or regulations after the publication of this manual and reference should be made to the most recent official version of the legislation and regulations. Anyone needing specific advice on his/her own situation should seek advice from a lawyer or an environmental expert. Examples and interpretations given are not binding on the Crown.

Acknowledgments

The *Pollution Prevention Workbook for Business in Nova Scotia* was commissioned by Nova Scotia Environment and Labour and Environment Canada and authored by the Eco-Efficiency Centre.

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Canadian Centre for Pollution Prevention
Resource Recovery Fund Board
Service Nova Scotia and Municipal Relations
Nova Scotia Department of Energy
University College of Cape Breton
Nova Scotia Power Inc.
Environment Canada
Eco-Efficiency Centre
Nova Scotia Environment and Labour
Daisy Kidston and Christine Ann Smith, MES students at Dalhousie University
Alberta Department of Environment

A special thanks is extended to Pat O'Neal of Canada Bread Atlantic for taking the time to provide comments from a business employee perspective.

Our appreciation is extended to Environment Canada for their exceptional efforts in having this workbook produced. A special acknowledgement is also extended to the Canadian Centre for Pollution Prevention and to Dr. Robert Pojasek for their wealth of knowledge and their contributions to this document.

We encourage businesses to produce copies of the Workbook as a reference for their pollution prevention efforts and to educate employees. The content of the Workbook is not to be altered without permission from the sponsoring agencies. The Workbook is designed to be updated and amended on a periodic basis. Check the Nova Scotia Environment and Labour website (www.gov.ns.ca/enla) to determine if you have the most recent edition.

February 2003

A Directory of Contacts for Business
Module 8

Throughout the Workbook, many references and resources in terms of written materials and websites have been provided to assist companies in finding further information. These will be useful as you investigate potential pollution prevention opportunities, environmental regulations and case studies from around the world. Sometimes, however, nothing short of local contact will do - a manager or an environmental committee will need to speak to someone familiar with the Nova Scotia landscape. You might require someone to answer questions about legislation, a guest speaker to talk with staff about a pollution prevention activity, or identify an expert from the business community – someone that has practical experience. You may want to find an engineer or consultant to advise you on opportunities.

This module, "A Directory of Contacts for Business" highlights "who's who" of organizations for businesses in terms of environmental issues in Nova Scotia. We've tried to make this list as current as possible at the time of printing, but like all directories, it will soon become out-dated. To keep it as a useful tool, we encourage you to add new contacts and remove out-of-date information over time. This list should change and grow as your environmental program takes shape!

The directory is divided into three sections - government, non-profit and community groups, and business/industry organizations, and is organized alphabetically by the name of the organization. If possible, a mailing address, phone number, fax, email and website are provided. If required, a short description of the organization is included. In some cases, the areas of expertise or interest have been defined.

Table of Contents:

8.1 Government

Federal
- Environment Canada
- Atlantic Canada Opportunities Agency (ACOA)
- National Research Council – Industrial Research Assistance Program (IRAP)

Provincial
- Environmental Emergencies
- Department of Environment and Labour
- Department of Energy
- Department of Natural Resources
- Public Safety / Office of the Fire Marshal
- Emergency Measures Organization

Municipal
- Union of Nova Scotia Municipalities (UNSM)
- Town and Municipal Contacts
- Solid Waste-Resource Management Regions Nova Scotia Regional Offices

8.2 Non-Profit and Community Organizations
- Atlantic Canada Action Program (ACAP)
- Canadian Centre for Pollution Prevention (C2P2)
- Clean Nova Scotia
- Eco-Efficiency Centre
- Ecology Action Centre
- Nova Scotia Materials Exchange (NSMex)
- Nova Scotia Nature Trust
- RRFB Nova Scotia
- Other Listings

8.3 Industry and Business Organizations
- Association of Professional Engineers of NS (APENS)
- Canadian Association of Exporters and Manufacturers (CME)
- Canadian Plastics Industry
- Consulting Engineers of Nova Scotia (CENS)
- Chambers of Commerce/Boards of Trade
- Nova Scotia Environmental Industries Association (NSEIA)
- Nova Scotia Home Builders Association
- Tourism Industry of Nova Scotia (TIANS)
- Other Directories

8.1 Government

Federal Government

Environment Canada
45 Alderney Drive
Dartmouth, NS B2Y 2N6
Telephone: (902) 426-7231
Fax: (902) 426-6348
E-mail: 15th.reception@ec.gc.ca
Website: http://www.atl.ec.gc.ca/

Areas
Pollution Prevention, Sewage treatment, Solid Waste, CEPA, General, CEPA, Fisheries Act, NPRI, Emergencies, Hazardous Wastes, Mining, Aquaculture, CFCs

Atlantic Canada Opportunities Agency
Regional Office
1801 Hollis Street, Suite 600
P.O. Box 2284 STN M
Halifax, NS B3J 3C8
Telephone: (902) 426-6743 or Toll Free 1-800-565-1228
Fax: (902) 426-2054

Enterprise Cape Breton Corporation
Commerce Tower, 4th floor
15 Dorchester St.
P.O. Box 1750
Sydney, NS B1P 6T7
Telephone: (902) 564-3600 or Toll Free: 1-800-705-3926
Fax: (902) 564-3825
http://www.acoa.ca

National Research Council's Industrial Research Assistance Program (NRC-IRAP)
NRC-IRAP helps small and medium-sized Canadian firms (SMEs) build their capability in technology and innovation. Industrial Technology Advisors (ITAs) are located in 90 communities across Canada. They work with companies on-site to assess needs and design solutions tailored to the individual business.

NRC-IRAP, Regional Head Office
1411 Oxford Street
Halifax, NS B3H 3Z1
Telephone: (902) 426-3138
Fax: (902) 426-1624
http://irap-pari.nrc-cnrc.gc.ca/english/main_e.html

Provincial Government

Environmental Emergencies
Toll Free: 1-800-565-1633

Nova Scotia Department of Environment and Labour
5151 Terminal Road, 5th Floor
P.O. Box 697
Halifax, NS B3J 2T8
Telephone: (902) 424-5300
Fax: (902) 424-0503
Website: http://www.gov.ns.ca/enla/

Areas
Pollution Prevention, Solid Waste-Resource Management
For Occupational Health and Safety
Toll-Free: 1-800-952-2687
Fax: (902) 424-3239
labrohs@gov.ns.ca

Department of Environment and Labour Regional & District Offices Contacts
The Regional & District Offices undertake many activities that small and medium-sized enterprises might have inquiries regarding - processing applications, inspection and monitoring of approvals, enforcement activities and response to public issues and complaints.

Western Region
136 Exhibition Street
Kentville, NS B4N 4E5
(902) 679-6086 (902) 679-6186

Middleton Office
142 Commercial St.
P.O. Box 1240
Middleton, NS B0S 1P0
(902) 825-2123 (902) 825-4471

Lunenburg & Queens Counties
60 Logan Road
Bridgewater, NS B4V 3J8
(902) 543-4685 (902) 527-5480

Liverpool Office
Waterfront Plaza, 1 Gorham St.
P.O. Box 819
Liverpool, NS B0T 1K0
(902) 354-5784 (902) 354-2453

Digby, Yarmouth & Shelburne Counties
13 First Street
Yarmouth NS B5A 2S9
(902) 742-0527 (902)742-7796

Central Region
1595 Bedford Highway, Suite 224
Bedford, NS B4A 3Y4
(902) 424-2664 (902) 424-0597

Sheet Harbour Office
PO. Box 58
Fire Hall 22835, Highway #7
Sheet Harbour, NS B0J 3B0
(902) 885-2462 (902) 885-2743

Dartmouth and Sackville, and East of Hwy 102
(902) 424-8003 (902) 424-0597
Dartmouth and Sackville, and West of Hwy 102
(902) 424-2664 (902) 424-0597

Northern Region:
44 Inglis Street, 2nd Floor
P.O. Box 824
Truro, NS B2N 5G6
(902) 893-5880 (902) 893-0282

Cumberland County,
32 Church Street
Amherst, NS B4H 3A8
(902) 667-6205 (902) 667-6214

Antigonish & Guysborough Counties
Kirk Place, 219 Main Street, Suite 205
Antigonish, NS B2G 2C1
(902) 863-7389 (902) 863-7411

Colchester County
(902) 893-5880 (902) 893-0282

Pictou County
P.O. Box 675 (Granton Road)
New Glasgow, NS B2H 5E7
(902) 396-4194 (902) 396-4765

Eastern Region
P.O. Box 714, 295 Charlotte Street
Sydney, NS B1P 6H7
(902) 563-2100 (902) 563-2387

Richmond Co., Southern Inverness, Town of
Mulgrave & Community of Auld's Cove
19 Pulp Mill Road
Point Tupper, NS B9A 1Z3
(902) 625-0791 (902) 625-3722

CBRM, Victoria Co. & Northern Inverness
(902) 563-2100 (902) 563-2387

Nova Scotia Department of Energy
PO Box 2664
Halifax, NS B3J 3P7
Telephone: (902) 424-4575
Fax: (902) 424-0528
Website: http://www.gov.ns.ca/energy/
Information on electricity, renewable energy resources, climate change, energy conservation and efficiency.

Public Safety / Office of the Fire Marshal
Toll Free: 1-800-559-3473
(Day time: 424-5721 - message centre answers between 4:30pm and 8:30am)

Emergency Measures Organization
PO Box 2581
Halifax, NS B3J 3N5
Telephone: (902) 424-5620 (24 hours)
Fax: (902) 424-5376
Website: www.gov.ns.ca/emo/info1/staff.htm

Municipal Government

Union of Nova Scotia Municipalities (UNSM)
Suite 1106
1809 Barrington Street
Halifax, NS B3J 3K8
Telephone: (902) 423-8331
Fax: (902) 425-5592
E-mail: mainunsm@hfx.eastlink.ca
Website: http://www.unsm.ca/

Town and Municipal Contacts
Contact town and municipal offices for information on by-laws and local facilities, and any programs that may be aimed at providing assistance on environmental issues to businesses. For an up-to-date listing of complete contact information for towns and municipalities in Nova Scotia, go to the Union of Nova Scotia Municipalities website (hppt://www.unsm.ca/)

Towns (telephone numbers):

Amherst	(902) 667-3352
Annapolis Royal	(902) 532-2043
Antigonish	(902) 863-1312
Berwick	(902) 538-8068
Bridgetown	(902) 665-4637
Bridgewater	(902) 543-4651
Canso	(902) 366-2525
Clark's Harbour	(902) 745-2390
Digby	(902) 245-4769
Hantsport	(902) 684-3211
Kentville	(902) 679-2500
Lockeport	(902) 656-2216
Lunenburg	(902) 634-4410
Mahone Bay	(902) 624-8327
Middleton	(902) 825-4841
Mulgrave	(902) 747-2243
New Glasgow	(902) 755-7788
Oxford	(902) 447-2170
Parrsboro	(902) 254-2036
Pictou	(902) 485-4372
Port Hawkesbury	(902) 625-2746
Shelburne	(902) 875-2991
Springhill	(902) 597-3751
Stellarton	(902) 752-2114
Stewiacke	(902) 639-2331
Trenton	(902) 752-5311
Truro	(902) 895-4484
Westville	(902) 755-7788
Windsor	(902) 798-2275
Wolfville	(902) 542-5767
Yarmouth	(902) 742-2521

Municipalities (telephone numbers):

County of Annapolis	(902) 532-2331
County of Antigonish	(902) 863-1117
District of Argyle	(902) 648-2311
District of Barrington	(902) 637-2015
Cape Breton Regional Municipality	(902) 563-5005
District of Chester	(902) 275-3554
District of Clare	(902) 769-2031
County of Colchester	(902) 897-3160
County of Cumberland	(902) 667-2313
District of Digby	(902) 254-4777
District of Guysborough	(902) 533-3705
Halifax Regional Municipality	(902) 490-4000
District of East Hants	(902) 758-2299
District of West Hants	(902) 798-8391
County of Inverness	(902) 787-2274
County of Kings	(902) 678-6141
District of Lunenburg	(902) 543-8181
County of Pictou	(902) 485-4311
Region of Queens Municipality	(902) 354-7473
County of Richmond	(902) 226-2400
District of Shelburne	(902) 875-3083
District of St. Mary's	(902) 522-2049
County of Victoria	(902) 295-3231
District of Yarmouth	(902) 742-7159

Solid Waste-Resource Management Regions Nova Scotia Regional Coordinators
Nova Scotia has seven solid waste-resource management regions. Each region has a Waste Reduction coordinator that provides specific information on waste resource management activities within their regions to residents and businesses.

Region 1 - Cape Breton (Cape Breton Regional Municipality, Municipality of the Counties of Inverness, Richmond and Victoria, Town of Port Hawkesbury)
Telephone: (902) 563-5141
Fax: (902) 564-0481

Region 2 - Antigonish, Guysborough, and Pictou (Municipality of the Counties of Antigonish, Guysborough and Pictou,
Municipality of the District of St. Mary's, Towns of Antigonish, Canso, Mulgrave, New Glasgow, Pictou, Stellarton, Trenton and Westville)
Telephone: (902) 533-2834 Fax: (902) 533-2801
or
Telephone: (902) 396-1495 Fax: (902) 396-4782

Region 3 -Cumberland, Colchester and East Hants (Municipality of the Counties of Colchester and Cumberland, Municipality of the District of Hants East, Towns of Amherst, Oxford, Parrsboro, Springhill, Stewiacke and Truro)Telephone: (902) 897-0450 Fax: (902) 897-0882

Region 4 - Halifax Regional Municipality
Telephone: (902) 490-7176
Fax: (902) 490-6690

Region 5 - Kings and Annapolis (Municipality of the Counties of Annapolis and Kings
Towns of Annapolis Royal, Berwick, Bridgetown, Kentville, Middleton, Wolfville and Hantsport)
Telephone: (902) 679-1325 Fax: (902) 679-1327

Region 6 - West Hants, Lunenburg, Queens and Shelburne (Mun. Dist.) (Region of Queens Municipality, Municipality of the Districts of Chester, Hants West, Lunenburg and Shelburne, Towns of Bridgewater, Lockeport, Lunenburg, Mahone Bay, Shelburne and Windsor)
Telephone: (902) 354-370 Fax: (902) 354-7472

Region 7 - Barrington, Yarmouth and Digby (Municipality of the Districts of Argyle, Barrington, Clare, Digby and Yarmouth, Towns of Clark's Harbour, Digby and Yarmouth)
Telephone: (902) 742-4404
Fax: (902) 742-4147

8.2 Non-Profit and Community Organizations

Atlantic Canada Action Program or ACAP - These are community-based, non-profit organizations formed to address local environmental and economic challenges. They are situated in 14 Atlantic Canadian communities with 5 located in Nova Scotia. (For information on ACAP, visit http://www.atl.ec.gc.ca/community/acap/index_e.html)

ACAP - Cape Breton
P.O. Box 28, Stn. A
Sydney, NS B1P 6G9
Telephone / Fax: (902) 567-6282
E-mail: acapcb@acapcb.ns.ca
Website: http://www.acapcb.ns.ca/
Issues of special interest: fish habitat enhancement, P2 with businesses, youth programs, beach sweeps, illegal dumpsites

Bluenose Coastal Action Foundation
(Lunenburg County area)
P.O. Box 10
Mahone Bay, NS B0J 2E0
Telephone: (902) 624-9888
Fax: (902) 624-9818
E-mail: brooke@coastalaction.org
Website: http://www.coastalaction.org
Issues of special interest: commuting, clean boating, stream and river restoration, community awareness of local environmental issues

Clean Annapolis River Project - CARP
(Annapolis River watershed)
P.O. Box 395, 21 Anthony Street
Annapolis Royal, NS B0S 1A0
Telephone: (902) 532-7533
Fax: (902) 532-3038
E-mail: c.a.r.p@ns.sympatico.ca
Website:
http://www3.ns.sympatico.ca/c.a.r.p/
Issues of special interest: volunteer water, quality monitoring, fish habitat restoration, pollution prevention, public education, coastal zone management, private stewardship initiatives, sustainable agriculture

Pictou Harbour Environmental Protection Project - PHEPP
P.O. Box 414, 111 Provost Street
New Glasgow, NS B2H 5E5
Phone/Fax: (902) 928-0305
E-mail: phepp@fox.nstn.ca
No Website

Canadian Centre for Pollution Prevention (C2P2)
A non-government, non-profit national organization that encourages pollution prevention and actions that foster a healthier environment and a sustainable society.
100 Charlotte St.
Sarnia, Ontario N7T 4R2
Telephone: (519) 337-3423 or Toll Free 1-800-667-9790
Fax: (519) 337-3486
E-mail: info@c2p2online.com
http://www.c2p2online.com

Clean Nova Scotia
Clean Nova Scotia is a non-profit environmental education organization that works with Nova Scotians to help them understand the importance of environmental responsibility and provide them with the means to make positive decisions about the environment.
126 Portland St.
Dartmouth, NS B2Y 1H8
Telephone: (902) 420-3474
Fax: (902) 424-5334
Website: http://www.clean.ns.ca/

Areas - Energy Conservation, Climate Change
Energy Efficiency, Water Conservation, Solid Waste, Waste Reduction, Sustainable Landscaping, Pesticides

Eco-Efficiency Centre
The Eco-Efficiency Centre is a non-profit, non-government educational and

environmental management support centre for small and medium-sized enterprises in Nova Scotia. It is supported by a partnership of university, private corporations, governments, and foundations that champion better environmental and economic performance in this sector. The mandate of the Centre is to move the environmental agenda forward by demonstrating that the right environmental choices can help business reduce costs and/or generate new revenue.
2 Vidito Dr.
Burnside Industrial Park
Dartmouth, NS B3B 1P9
Telephone: (902) 461-6704
Fax: (902) 461-6703
E-mail: kpcrawfo@dal.ca
Website: http://www.dal.ca/eco-burnside

Ecology Action Centre
The Ecology Action Centre is an active advocacy organization for the environment in Nova Scotia.
1568 Argyle St. Suite 31
Halifax, NS B3J 2B3
Telephone: (902) 429-2202
Fax: (902) 422-6410
E-mail: eac_hfx@istar.ca
Website: http://www.ecologyaction.ca

Issues of special interest:
Marine (sustainable fisheries, biodiversity, bio-invasions, deep sea corals, fish buying co-operatives, inshore and offshore petroleum, aquaculture, the beauty of the ocean), Coastal Issues (salt marshes, water trails, coastal access, eutrophication), Transportation (climate change, trip reduction, active transportation, cycling conditions in Halifax Regional Municipality, transportation & urban planning, sustainable transportation, active & safe routes to school), Wilderness (Integrated Resource Management (IRM), biodiversity, silvaculture, clear-cutting), Energy (renewable energy, energy conservation, wind power, oil & gas), Urban Issues (urban planning, urban greening)

Nova Scotia Materials Exchange (NSMex)
The Nova Scotia Materials Exchange has been established by RRFB Nova Scotia as another component of Nova Scotia's solid waste-resource management strategy. It is a province-wide, web-based database for businesses to submit and browse listings of unwanted waste materials and post notices of materials needed. Businesses can conserve resources, reduce waste, and save money.
http://www.nsmaterials.com
or contact the Eco-Efficiency Centre for a brochure at 461-6704

Nova Scotia Nature Trust
The Nova Scotia Nature Trust works with private landowners to protect significant natural areas throughout the province. It is a non-government charitable organization and a designated conservation organization under the provincial Conservation Easements Act of
1992. The Nature Trust pursues land ownership, conservation, easements and cooperative agreements with landowners.
Box 2202
Halifax, NS B3J 3C4
Telephone: (902) 425-5263
Fax: (902) 429-5263
E-mail: nature@nsnt.ca
Website: http://www.nsnt.ca

RRFB Nova Scotia
The RRFB is a private, not-for-profit organization with a mandate to oversee the deposit-refund program for beverage containers, create jobs by promoting the manufacturing of new products, negotiate industry stewardship agreements, direct funding to municipalities and educate the general public.
14 Court Street, Suite 305
Truro, NS B2N 3H7
Toll Free Solid Waste Hotline: 1-877-313-RRFB (7732)
General Inquiries: (902) 895-RRFB (7732)
Fax: (902) 897-3256
E-mail: info@rrfb.com

Other:

A number of organizations in the province have websites that provide comprehensive links pages to many other non-profit and education organizations in Nova Scotia that relate to environmental issues. Rather than repeat all of the contact information, we direct you to some of these websites to browse for topics that may be of interest to your business:

STANet: Science and Technology Awareness Network -
http://is.dal.ca/~stanet/
This is a network of organizations, government departments, educators and individuals
working together to promote awareness of science and technology developments and programs in Nova Scotia. STANet acts as a pipeline of information between science and technology related businesses and organizations and the public. The STANet SciTech Resource Database contains links to information on close to 200 Nova Scotian science and technology organizations.

Examples:
Acadia Centre for Estuarine Studies
Alliance for Marine Remote Sensing
American Society for Quality
APICS: Atlantic Provinces Council on the Sciences
Aquaculture Association of Nova Scotia
The Atlantic Space Sciences Foundation (TASSF)
BioScan Analytical Services
Brier Island Ocean Study (BIOS)
Cape Breton Naturalists Society
CAPP- Community Action Partnership Program
Ducks Unlimited
Eastern Shore Wilderness Group
Federation of Nova Scotia Naturalists
Friends of McNab's Island
Halifax Field Naturalists
Inventors Society of Nova Scotia
Margaree Environmental Association
NS Environmental Network
NS Oceans Initiative
Sackville Rivers Association
Scientists and Innovators in the Schools
Shubenacadie Canal Commission
Society for Amateur Scientists
Soil and Water Conservation Society
Solar Nova Scotia
The Sustainable Communities Network of NS
Tusket River Environmental Protection Association

Nova Scotia Nature Trust -
http://www.nsnt.ca/links/
This website has links to some of the following local organizations:
Sierra Club Nova Scotia
Friends of Hemlock Ravine
Atlantic Canada Conservation Data Centre
Bras d'Or Stewardship Society
Bras d'Or Preservation Foundation
The Blomidon Naturalists Society
Tobeatic Wilderness Committee
NS Organic Growers Association
Sable Island Preservation Trust
Real Alternatives to Toxins
Sierra Youth Coalition
Eastern Shore Forest Watch
Wildflowers of Nova Scotia
Be the Change
Nova Scotia Bird Society
The Orchid Society of Nova Scotia
Nova Scotia Wildflora Society
Natural History of Nova Scotia

The **Soil & Water Conservation Society** of Metro Halifax (SWCSMH) -
http://www.chebucto.ns.ca/Science/SWCS/SWCS.html
This website has links to studies, reports, data and information on anything water or soil related, from the local to the international level.

8.3 Industry and Business Organizations

Many of these organizations and associations have directories of links and lists of members that may be useful for you in looking for suppliers, consultants, "green businesses", and other experts.

Association of Professional Engineers of Nova Scotia (APENS)
P.O. Box 129
Halifax NS B3J 2M4
Telephone: (902) 429-2250 or Toll Free: 1-888-80APENS
Fax: (902) 423-9769
info@apens.ns.ca
http://www.apens.ns.ca/

Canadian Manufacturers and Exporters – Nova Scotia Division
1869 Upper Water Street
Collins' Bank Building, 3rd Floor
Halifax NS B3J 1S9
Tel: (902) 422-4477
Fax: (902) 422-9563
http://www.cme-mec.ca

Canadian Plastics Industry Association – Atlantic
101 Research Dr., P.O. Box 790
Dartmouth NS B2Y 3Z7
Telephone: (902) 424-8670 ext.143
Fax: (902) 424-4679
e-mail atlantic@cpia.ca
http://www.cpia.ca/

Chambers of Commerce - Nova Scotia

East Hants Chamber of Commerce
P.O. Box 76
Milford, NS B0N 1Y0
(902) 758-4257 (902) 758-4257
http://www.easthantschamber.ca

Eastern Kings Chamber of Commerce
Box 314
Kentville, NS B4N 4H8
(902) 678-4634 (902) 678-5448
http://www.easternkingschamber.ns.ca

Industrial Cape Breton Board of Trade
P.O. Box 131, 335 George St.
Sydney, NS B1P 6G9
(902) 564-6453 (902) 539-7487
http://www.icbbot.com

Metropolitan Halifax Chamber of Commerce
P.O. Box 8990
Halifax NS B3K 5M6
(902) 468-7111 (902) 468-7333
info@halifaxchamber.com
http://www.halifaxchamber.com/

Pictou County Chamber of Commerce
980 East River Road
New Glasgow, NS B2H 3S8
(902) 755-3463 (902) 755-2848
pccc@north.nsis.com
http://www.pictouchamber.com/

Truro and District Chamber of Commerce
P.O. Box 54, 577 Prince Street
Truro, NS B2N 1G2
http://www.trurochamber.com

Consulting Engineers of Nova Scotia
An association of Nova Scotian firms in the business of consulting engineering and related services
P.O. Box 613, Stn. "M"
Halifax NS B3J 2R7
Telephone: (902) 461-1325
Fax: (902) 461-1321
E-Mail: nscea@atcon.com
http://www.cens.org/

Enviro-Depot® There are approximately 85 Enviro-Depots® in the province. To find the one nearest you, check the RRFB website at http://www.rrfb.com/pages/listenviro.html for addresses and phone numbers, or contact your Regional Waste Reduction Coordinator.

Nova Scotia Environmental Industries Association (NSEIA)
NSEIA is a business organization whose purpose is to promote environmental

products and services and contribute to sustainable development in Nova Scotia.
One Research Dr, Suite 206-1 / 206-2
Dartmouth NS B2Y 3Y8
Telephone: (902) 463-3538
Fax (902) 466-6889
http://www.nseia.ns.ca

Nova Scotia Home Builders Association
15A Oland Crescent, Bayers Lake Business Park
Halifax NS B3S 1C6
Telephone: (902) 450-5554 or Toll Free 1-800-668-2001
Fax: (902) 450-5448
E-Mail: nshba@nshba.ns.ca
http://www.nshba.ns.ca

Tourism Industry Association of Nova Scotia
1099 Marginal Road, Suite 201
Halifax, NS B3H 4P7
Telephone: (902) 423-4480 or
Toll Free 1-800-948-4267
Fax: (902) 422-0184
E-Mail: tians@tourism.ca
http://www.tians.org

Other Directories:

Nova Scotia Business Directory
http://www.nswide.com/

Directory of Solid Waste, Reuse, Recycling and Composting
Contacts in Nova Scotia
http://www.gov.ns.ca/enla/emc/wasteman/contents.htm

Appendix A

Pollution Prevention Group Exercise

You've read about the need for appropriate assessment of pollution prevention techniques before attempting to implement an opportunity. To help your company better understand some of the considerations, use this exercise with your staff on assessing techniques for reducing workplace environmental pollutants. This activity works well with three small groups of three - six people. Each group receives a list of five pollution prevention/pollution control techniques or solutions. For each list, the group needs to answer the following questions about each of the five options:

#1. Is the technique/solution pollution prevention or is it pollution control?
#2. How much does the technique/solution contribute to the protection of the environment, on a scale of 1 (little protection) to 5 (lots of protection)?
#3. How much does the technique/solution contribute to the protection of workers, on a scale of 1 to 10?
#4. What's the likelihood of getting someone to do this (low or high)?

Give small groups 15-20 minutes to discuss their five options. Some options will seem to be clear-cut, but others will result in considerable discussion and not necessarily receive unanimous agreement around the table. Finish up the exercise by letting the entire group discuss the options that posed most difficult to categorize or those that seemed to be contradictory (e.g., protected the environment, but not the workers). Were there any apparent trends as to whether some of the options were likely to get implemented?

Group #1

- Increasing the flow rates of rinse water so that the resulting concentration of chemicals in your wastewater meets municipal sewer use bylaw requirements.
- Replacing incandescent lamps in the employee parking lot with energy efficient lamps.
- Using water-based cleaners in place of solvent-based ones.
- Sending waste paper from the photocopier off-site for recycling.
- Switching from plastic grocery bags to reusable cloth bags.

Group #2

- Replacing more toxic alkyd resin paint with latex paints.
- Using a filter in a car exhaust system to reduce emissions of diesel particulates.
- Using canola-based hydraulic fluids instead of petroleum-based ones for heavy equipment.

- Replacing ozone-depleting refrigerants with propane.
- Sending sludge from an on-site wastewater treatment plant to a local farmer to use as a fertilizer supply on crops.

Group #3

- Collecting fluorescent lamps for off-site recycling with mercury recovery.
- Using a silver recovery unit in photoprocessing to capture silver before discharge of wastewater to municipal waster treatment plant.
- Replacing the nozzle of a high-pressure paint applicator to focus the paint spray system.
- Training staff on spill prevention and clean-up.
- Using baking soda and vinegar to unclog drains in your home.

Pollution Prevention Planning Manual: P2 Planning and Beyond, 2001
From Canadian Centre for Pollution Prevention

Pollution Prevention Workbook
For Business in Nova Scotia

Appendix B

Feasibility Assessment Checklist

In doing detailed feasibility assessments, there are a number of considerations that should be taken into account to ensure that the benefits outweigh the costs. In some cases, switching to alternative materials might involve higher energy or human resource costs. In others, the benefits can only be realized by considering the costs associated with the use of the product or technology. Another option may cost more at the purchasing stage, but substantially reduce disposal costs. In a number of instances, additional information will have to be sought before the option can be thoroughly assessed.

The following tables and associated checklists may assist you to begin to consider the factors that may be involved in an in-depth assessment of a pollution prevention opportunity and will give you a method to prioritize your options if you decide not to undertake further assessment. Several possible options should be assessed so that opportunities can be prioritized in terms of greatest financial and environmental benefits.

Prior to considering pollution prevention options, remember that requirements legislated by municipal, provincial, and federal authorities must be considered an absolute priority and should not be assessed for feasibility with the other options.

Steps:

1. As you work through the modules, you may identify pollution prevention options that are complex or potentially capital intensive. List these options in *Table 1: Feasibility Ranking.*

2. The next step is to assign a "ranking score" for each of the options on the basis of technical and economic feasibility and environmental benefits. Ranking can be subjective but use the checklists to help you. For each option, you need to answer the questions in *Checklists 1, 2 and 3.* (Note: you will need to make copies of these checklists)

3. Total the number of "yes" answers in each checklist - your ranking score for each option corresponds to the number of "yes" answers from each checklist. If you have a lot of "don't know" answers, you may have to do further research such as contacting vendors/suppliers.

If the pollution prevention option has:	Give the option a Ranking Score of:
7-9 Yes answers	1
3-6 Yes answers	2
1-2 Yes answers	3
0 Yes answers	4

4. Return to *Table 1: Feasibility Ranking.* For each option, fill in the three ranking scores – one each for technical feasibility, economic feasibility and environmental benefits.

5. Next, total the ranking scores for each option. List your options in order with the lowest numbers first. This list can be used as your priority list. Legislated requirements need to be completed first.

You may also want to consider other factors prior to setting the priorities. Is there a marketing advantage for your products? Do employees have the skills and knowledge required to realize this option?

6. List the priorities for action in your business in *Table 2: Priorities for Action.*

1. CHECKLIST – TECHNICAL FEASIBILITY ASSESSMENT

Questions	**Yes/ Probably**	**No**	**Don't Know**	**Not Applicable**
Will this option improve on product quality?				
Will this option improve on productivity?				
Will this option improve on occupational safety and health?				
Have you determined that this option has a proven track record?				
Are you certain that this option will not simply move waste problems from one form to another (e.g. from solid wastes to air emissions)?				
Is your plant layout and design capable of incorporating this option?				
Will the vendor guarantee this option?				
Are materials and parts readily available?				
Does this option promote in plant reuse/recycling?				
TOTAL				

2. CHECKLIST – ECONOMIC FEASIBILITY ASSESSMENT

Questions	Yes/ Probably	No	Don't Know	Not Applicable
Will this option reduce your expenditure on energy?				
Will this option reduce your expenditure on raw materials?				
Will this option reduce expenditure on additional materials (such as cleaning agents)?				
Will this option reduce expenditure on water?				
Will this option reduce expenditure on waste disposal?				
Will this option reduce expenditure on controlling effluents and air emissions?				
Will this option reduce expenditure on wastewater treatment?				
Will this option reduce expenditure on waste storage?				
Will this option reduce your insurance premium?				
TOTAL				

3. CHECKLIST – ENVIRONMENTAL BENEFITS ASSESSMENT

Questions	Yes/ Probably	No	Don't Know	Not Applicable
Will this option reduce your energy consumption?				
Will this option reduce the amount of water used?				
Will this option reduce the amount of raw materials used?				

Will this option minimize the amount of contaminated water?				
Will this option minimize effluents and air emissions?				
Will this option minimize hazardous waste?				
Will this option minimize the amount of solid waste?				
Will this option reduce the number of work-related accidents?				
TOTAL				

Table 2: Priorities for Action	
Legislated Requirements (Complete first):	
1.	
2.	
3.	
4.	
5.	
Pollution Prevention Options:	
1.	
2.	
3.	
4.	
5.	

Pollution Prevention Workbook
For Business in Nova Scotia
Appendix C

Nova Scotia Department of Environment and Labour
Contingency Plan Criteria
For Releases of Dangerous Goods and Hazardous Wastes

Issued by:	The Nova Scotia Department of the Environment
Revised Date:	March 26, 1990
Status:	Guidelines

1. INTRODUCTION

1.1 General

The preparation of a contingency plan requires that a specific operation be looked at to identify what can create a hazard (such as products or wastes); how such things are stored, handled or transported; where leaks or releases may occur; what damage can result; who can respond to the incident and how they will respond. The goal of a good contingency plan is a good action plan. A contingency plan should consider the involvement of local authorities as any incident might create a response by them.

It is the intention of this document to address requirements of the Nova Scotia Department of the Environment (NSDOE) for the filing of contingency plans under the various pieces of legislation enforced by the Department. Prior to preparing any contingency it is recommended that the Department be contacted to ensure that the most recent criteria document is used. The contingency plan must provide the information outlined in Section 2 in the order as outlined unless otherwise approved.

NSDOE must be immediately notified of any revisions in emergency response contacts by telephoning the Environmental Emergencies & Hazardous

Materials Section in Halifax, Nova Scotia. Copies of these and any other major revisions to any contingency plan must be submitted to the Environmental Emergencies & Hazardous Materials Section within 10 working days of the revision. NOTE: Any revisions which weaken the contingency plan may void any previous approval.

1.2 Definitions

Approval means approved by the Director of Resource Management and Pollution Control Division for the Nova Scotia Department of the Environment.

Contingency Plan means a predetermined communications and action sequence which can be initiated immediately to cope with an event of potential but uncertain occurrence.

Countermeasures Phase means the time period beginning at the time of the occurrence and ending upon completion of all required procedures, including the filing of a report detailing the response, if necessary.

Occurrences means releases of deleterious substances into the environment and includes materials regulated or controlled under the Dangerous Goods Transportation Act, Environmental Protection Act, Pest Control Products Act and the Dangerous Goods and Hazardous Wastes Management Act.

Response Team Leader means the person in charge of the countermeasures phase and in most cases this person would be representing the party responsible for the occurrence unless the applicable government authority has taken over the response.

2. CONTENTS OF THE CONTINGENCY PLAN

2.1 Table of Contents

The table of contents shall indicate the various subdivisions of the plan as well as the associated page number.

2.2 Scope

This section should identify the general terms of reference of the contingency plan and would include the following:

1. Purpose of the plan;
2. Geographic or physical location of where the plan will operate; and
3. Listing of organizations and other groups who have specific responsibility under the plan.

2.3 Notification Procedures

2.3.1 General

All notification procedures shall be operational 24 hours per day and all applicable telephone numbers must be shown. The notification procedure must identify the following:

- What is to be reported and with what urgency;
- By whom is it reported; and
- To whom is it to be reported.

This section must include the following:

1. Internal procedures whereby personnel discovering a release will advise the response team leader who will then activate the internal reporting procedures within his own organization;

2. External procedures whereby the person-in-charge will report releases to the Environmental Emergency Reporting System operated within the Province; and
3. A 24 hour corporate telephone number above must be included for the regulatory authorities use as an ultimate contact should a corporate response be considered inadequate.

2.3.2 Notification List

The notification list shall include the office and home and/or the 24 hour telephone numbers for activating emergency reporting plan, local response team, local management and if applicable the regional or national management.

Other numbers that must be included are the Environmental Emergencies telephone number operated within Nova Scotia and applicable municipal authorities such as the police and fire services.

Numbers which should be considered are:

- Hospital
- Ambulance
- Industry assistance contacts
- Local clean-up contractors
- Government assistance contacts such as CANUTEC; and
- Firms who can supply response materials noted in the plan.

2.4 Role of the Response Team Leader

The response team leader is the person in charge of the countermeasures phase of any clean-up. The response team leader must perform or ensure the performance of the following:

1. Make decisions;
2. Commit resources;
3. Communicate with personnel representing governmental agencies;
4. Direct the use of needed resources;
5. Act as the focal point for information exchange;
6. Ensure that samples are collected; and
7. Prepare and submit a report detailing the response when necessary.

This section must clearly define the scope of the authority and responsibility of the designated response team leader. Should the designated response team leader have limited authority the procedure to activate the higher level of response must be indicated.

2.5 Containment and Clean-Up Procedures

2.5.1 Non-Transport Related Releases

The response plan shall identify the product or products and maximum quantity that may be released, types of containment and clean-up equipment which can be employed, potential health and environmental hazards, and a description of the site indicating the expected point of discharge area likely to be impacted and key features (culverts, catch basins, streams, etc.).

2.5.2 Transport Releases

An emergency response plan shall include all of the section 2.5.1 above when applicable and as a minimum will include the requirements of paragraph 7.17 (b & d) of the Dangerous Goods Transportation Regulations (Canada) published in 1989.

2.6 Restoration of the Spill Site Following a Release to the Environment

A site restoration plan shall have as a minimum objective the restoration of the site so that it can be safely used for the same purposes as it was prior to the spill. A method to take immediate restorative measures must be indicated, however the Department of the Environment may place more stringent requirements for site restoration depending on the circumstances which exist at the time of site restoration.

2.7 Disposal

Contingency plans shall contain acceptable disposal procedures suitable for the contingencies for which the plan was written. Adequate disposal techniques are a complex problem and may include both in and out-of-province disposal.

The plan should include information on disposal options as follows:

- Location of disposal site(s) approved to accept the materials which may be involved in an occurrence;
- Method of transport;
- Waste disposal contractors;
- Means of storage prior to disposal; and
- Approvals required.

2.8 Resources

The plan shall include an inventory on available resources including contacts and will include the following:

- Countermeasure equipment;
- Manpower;

- Contractors;
- Treating agents;
- Expertise;
- Communications;
- Emergency Information Systems; and
- All pre-arranged contracts to provide the above must be identified as well as the mechanism to obtain the desired resource.

2.9 Public Relations

Method to carry-out public relations shall be identified and must identify who can speak on behalf of the concerned party.

2.10 Reporting

The Department may request a report from responsible parties depending on the severity of the release and degree of concern which resulted from the release. The plan shall include information on who and/or what position will be responsible for submitting the report.

The report shall include the following:

- Date and time of release;
- Weather conditions at the time of release and during the response phase;
- Cause of the release;
- Product or products involved;
- Quantities involved;
- Areas and/or properties impacted;
- Identification of all parties and individuals involved in the response or exposed to the product or its vapours including by-products of combustion;
- Any health treatments or tests conducted on individuals;
- Containment used;
- Clean-up techniques employed;
- Disposal methods used including quantities and location;
- Site remediation completed and planned;
- Short and long term impacts;
- Status of the response;
- A log of actions taken including associated times; and
- Measures to be implemented to prevent any re-occurrence.

3. TRAINING

An emergency situation often provides an unfamiliar, emotional, and hostile working environment for the responders. Anyone with little training or experience will have difficulty dealing effectively with the incident.

A sound training policy involves reviewing and updating as required. Concentrated training should be considered a necessity. Fundamentals include knowledge and use of any response equipment that may be used as well as knowledge of the hazards from the products likely to be encountered.

The response team leader should be trained in handling pressure situations, decision making and managing people, communications, and resources.

Employees should be properly trained in technical procedures and be thoroughly familiar with company policy and procedures for responding to incidents. Training should provide rapid and competent response, vital to success in an emergency situation.

It is not unusual for problems to arise between parties that have an agreement with respect to co-ordinating activities at an accident. Be sure that every aspect of each party's role is understood through joint participation at exercises.

4. EXERCISES AND INVESTIGATIVE FOLLOW-UP

Simulation exercises allow the plan to be scrutinized under conditions which approximate an actual incident. Assessment can be done in stages whereby one specific aspect of the plan is evaluated at a time. When each stage has been reviewed, then a full-scale scenario could be introduced.

Table-top or paper exercises help foresee problems without the expense of simulations. Evaluation can then be done on the effectiveness of various aspects of the plan such as activation, the team's response capability, quality of training, functioning of equipment, etc.

Realism is critical to good assessment. Provide as much as possible to best evaluate the plan.

5. MAINTENANCE OF RESPONSE EQUIPMENT

The plan should list the type of and show schedules for preventative maintenance of relevant equipment.

6. UPDATING

Someone should be responsible for updating and informing all plan holders of any changes. A notation should be written and recorded on a "Record of Amendments" page at the front of the plan and consecutively numbered for each reference. The most common amendments include telephone listings, named response personnel, equipment available, list of dangerous goods handled, and emergency services available. When an organization has dealt with an incident, the response should be evaluated, the plan updated and modified as necessary.

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Appendix D

List of CEPA-Toxic Substances

The following are the twenty-six substances currently regarded as toxic by CEPA (Source: CEPA Registry - http://www.ec.gc.ca/ceparegistry/the_act/schedules_1.cfm)

1. Chlorobiphenyls
2. Dodecachloropentacyclo decane
3. Polybrominated Biphenyls
4. Chlorofluorocarbon
5. Polychlorinated Terphenyls
6. Asbestos
7. Lead
8. Mercury
9. Vinyl Chloride
10. Bromochlorofluoromethane
11. Bromotrifluoromethane
12. Dibromotetraflurorethane
13. Fuel containing toxic substances that are dangerous goods within the meaning of section 2 of the Transportation of Dangerous Goods Act 1992 and that
    a) are neither normal components of the fuel nor additives designed to improve the characteristics or performance of the fuel; or
    b) are normal components of the fuel or additives designed to improve the characteristics or performance of the fuel, but are present in quantities or concentrations greater than those generally accepted by industry standards.
14. Dibenzo-para-dioxin
15. Dibenzofuran
16. Polychlorinated dibenzo-para-dioxins
17. Polychlorinated dibenzofurans
18. Tetrachloromethane
19. 1,1,1-trichloroethane
20. Bromofluorocarbons
21. Hydrobromofluorocarbons
22. Methyl Bromide
23. Bis(chloromethyl)
24. Chloromethyl
25. Hydrochlorofluorocarbons
26. Benzene

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Appendix E

Environmental Purchasing/Procurement - The "Cornerstone" of Greening A Business

Environmentally preferable purchasing (or green or eco-purchasing/procurement) has been mentioned in a number of modules in this Workbook. It means including environmental considerations into your organization's purchasing policies, programs and actions. In its simplest forms, it can be purchasing recycled or remanufactured toner cartridges, buying office supplies in bulk, and purchasing environmentally friendly cleaners. But, it can be much more inclusive, incorporating all aspects of the purchase of both goods or services, and includes elements such as environmental labelling, recycled content, toxicity reduction, recyclability, reusability, durability, energy efficiency, water conservation, reduced packaging, environmentally efficient suppliers, and reused/repaired products.

Because eco-purchasing can play such a key role in the overall greening of a company, companies have to be comfortable that they aren't sacrificing quality, performance, safety or cost when they put green purchasing practices into place. Environmental labelling is the labelling of products and services based on environmental considerations. There are many different environmental labelling systems with the aim to educate and assist consumers to make responsible purchasing choices. Eco-labels relate the environmental impact of the item or service and a standardized means to compare products and services. However, one of the major problems with eco-purchasing is "green" marketing claims that mislead buyers. Advertising around green labels, claims, terminology and symbols often fools consumers, and suggestive packaging or symbols can be misleading. And, in the past, green products/services haven't always lived up to their claims, turning off consumers. This has changed, and many green products are both competitively priced and come with quality guarantees. Green purchasing can often translate into immediate cost savings or longer term savings from reduced downstream wastes.

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In 1988, the federal government of Canada established an environmental certification process called the "Environmental Choice" program. Over 2000 products and services have met or exceeded the standards of this program and now bear the EcoLogo symbol. The EcoLogo indicates that a product/service improves energy efficiency, reduces hazardous waste by-products, uses recycled materials, or can itself be reused.

Key Procurement Strategies To Remember
- Purchase durable goods
- Lease and rent when appropriate
- Specify product and packaging take-back
- Buy goods in bulk or concentrated form

- Manage surplus effectively
- Purchase recyclable items and items with recycled content
- Procure remanufactured goods and use refurbishing services
- Purchase goods containing fewer toxic constituents

From INFORM, Inc, an independent research organization that examines the effects of business practices on the environment and on human health – http://www.informinc.org/PBT.htm.

Pollution Prevention and Cleaning Products
Every business uses cleaning products. In purchasing cleaners, consider these questions:

- Is it non-toxic to both humans and aquatic life?
- Is it bio-degradable?
- Does it have a low-corrosivity factor?
- Does it have acceptable VOC levels?
- Is it sold in concentrated form?
- Can it work for multiple cleaning purposes?
- Is it effective when diluted with water at room temperature?

From Green Seal's "Chose Green Report" on Industrial and Institutional Cleaners - www.greenseal.org/

Green Purchasing Checklist - Questions to ask before you buy a product for your company

	Yes	**No**	**Don't Know**	**Not Applicable**
Is the product durable and does it have a warranty demonstrating the supplier's confidence in its durability?				
Has the supplier/manufacturer made efforts to reduce the amount of packaging necessary to properly and safely ship, store, and use the product?				
Does the product arrive from the supplier packaged in materials that are reusable, e.g. plastic totes, reusable skids?				
Does the product arrive from the supplier packaged in materials that can be recycled within established and available collection and recycling programs?				
Does the supplier take back the packaging for reuse or recycling?				
Does the packaging material have post-consumer recycled content?				
Is the product less polluting during its use than				

competing products (e.g., non-toxic, biodegradable)?				
Is the product free from resources that come from environmentally sensitive regions?				
Is the product free from banned substances?				
Is the product designed to minimize waste?				
Is the product repairable, or does it have replaceable parts?				
Does the product contain post-consumer recycled materials?				

(From "Product Checklist for Environmentally Appropriate Characteristics, "Going Green: Using Environmental Purchasing Practices to Improve Your Bottom Line" Purchasing Management Association of Canada www.pmac.ca)

References and Resources

Buy Green http://www.buygreen.com

Canadian Standards Association http://www.csa.ca

Eco-tique http://www.ecotique.com

Environmental Choice Programme
http://www.EnvironmentalChoice.com

Global EcoLabelling Network http://www.gen.gr.jp

Green Seal http://www.greenseal.org/

INFORM, Inc. http://www.informinc.org/PBT.htm

Office of Energy Efficiency-Energuides
http://oee.nrcan.gc.ca/english/programs/index.cfm

US-EPA Energy Star http://www.energystar.gov

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Appendix F

Environmental Training and Awareness Programs

It's been said that pollution prevention is more of a "way of life" for a company and not so much a new program. Many changes that are required are behavioral changes that cannot simply be demanded of staff.

Employees need to understand why the programs and policies are introduced and what is required of them when trying to improve the environmental performance of the company.

To maximize the potential improvements to the environmental performance of companies, many studies and authors have pointed to employee involvement and environmental training as key components of successful environmental improvement efforts. To participate fully, employees need to understand why the programs and policies are introduced and what is required of them when trying to improve the environmental performance of the company. The employees need to be given the appropriate information to make the right decisions when faced with environmental situations. An environmental training program for all members of an organization will ensure that a company's environmental policies and expectations are understood by all. It can then better guarantee that the entire company is working towards the same goals of reducing the environmental impacts of the company.

Environmental training which improves the level of environmental awareness in the organization can also bring other benefits. Employees and other members of the community may be concerned by the unwelcome effects a company may have on the environment. As a result, by providing an environmental training program, the company can show its employees it is addressing these issues. Also, environmental awareness has been linked with improved employee morale, an improved ability to retain qualified staff, lower staff turnover, greater job satisfaction, and better motivated staff.

Environmental awareness has been linked with improved employee morale, an improved ability to retain qualified staff, lower staff turnover, greater job satisfaction, and better motivated staff.

An environmental training program capable of bringing about these benefits needs to include more than the list of environmental policies - it should improve the environmental awareness of all the employees in the company from senior management to the maintenance employees. Including the members of senior management is important as it will help frame the reasons behind the environmental policies and the environmental efforts in the company and, in doing so, it will help gain the support of employees.

The environmental training program should address how the company and its processes affect the environment and how the environmental programs and the many actions posed by each employee can help reduce these impacts. When creating such a program, it is important to identify what the environmental impacts of your organization are. Also, the goals and objectives of the environmental training program should be clearly stated when creating the program. This will allow a better assessment of the program's success.

A company can create an environmental training program on its own or with outside help but it is crucial that the company be part of the development and the delivery of the program. It is critical that the company own the material and understand the delivery of it so to be able to assess whether the training was a success and what should be changed in the future if needed.

There are a number of companies in Nova Scotia with active environmental committees or "green teams". These include Oland Breweries Ltd., Swedwood Canada Ltd., and Jacques Whitford (Dartmouth). Check out case studies that examine efforts of the Swedwood and Jacques Whitford green teams at www.dal.ca/eco-burnside. The Oland Green Team can be reached by mail at Oland Green Team, Oland Breweries Ltd., 3055 Agricola St., Halifax, NS B3K 4G2

Green Teams

One of the first steps in pollution prevention planning is the creation of an effective "green team" or pollution prevention team. Many leading-edge companies may already have an environment committee. As has been noted, many companies have a Health and Safety Committee. You may simply have an "eco-champion" - someone in your organization who pushes for workplace environmental programs. Any of these may be a good place to start to build a team to plan and implement pollution prevention initiatives.

You'll want to include personnel from different departments so you have a good cross section, representing all interests and resources of the company. You need people with production line, financial and purchasing experience. A senior staff member should be involved. How big is a team? In small companies, two people may be adequate, in larger operations perhaps six or seven. For this committee to be successful will require top-management support, an adequate budget, and ready access to all employees.

***Case Study:** Experience has shown that even a stand-alone employee awareness program has the potential to generate significant savings at low cost, provided it is well run. The employee awareness program at Canadian Forces Base (CFB) Halifax, for example, initially cost $20,000 per year and was expected to generate savings of $50,000 per year. Overall savings due to energy performance contract retrofits and the base's energy awareness program have exceeded original estimates by 20 percent. The current annual savings*

If you are developing a comprehensive pollution prevention plan, your team will begin by developing company policies, objectives and target settings around pollution prevention. They will assess pollution prevention opportunities and set priorities. The following section on Tools for Green Teams provides instructions for "easy to use" methods for identifying and assessing opportunities.

Tools for Green Teams

There are a variety of methods that can be used by Green Teams to identify pollution prevention options. Methods that can be used in *from all energy efficiency measures at CFB Halifax are now $1.9 million. From: Natural Resources Canada, Office of Energy Efficiency*

conjunction with the checklists provided in the Workbook modules include facility walk-throughs, cause and effect diagrams, brainwriting, and bubble-up, bubble-down exercise.

It is a good idea for Green teams to complete a facility walk through for the following reasons:

- Bring all green team members up-to-date on the plant operations
- Understand activities / operations – all waste sources, sources of "toxic" material usage
- Understand "why & how" wastes are produced
- Assemble the data into information for analysis
- Identify specific plant personnel who might have specific knowledge or options ideas
- Identify current pollution prevention activities
- Start identification of potential pollution prevention options
- Have an opportunity to see procedures in practice and talk to staff

***Tip:** Looking for ways to keep the lines of communication with employees open? Try regular staff meetings, e-mail bulletins, accessible managers and in-house newsletters. Centrally located bulletin boards or suggestion boxes can stimulate discussion and ideas. Provide materials to inform employees about economic, environmental and social trends - well-written books and articles, videotapes, and the occasional guest speaker or external course can put a company's efforts into perspective. Informed employees will be better equipped to promote company goals and to respond to major trends.*

Walk-throughs should follow the path the materials take, from the receiving dock, along the process flow, and ending with the product storage and shipping areas, as well as waste treatment or storage areas. Let employees know why this is taking place and ask them for suggestions on how they would improve a process. Time the site assessment when shifts/processes are working and avoid down times at first. You may want to check these later to see what happens then – e.g. cleaning.

Green Teams may want to think about the following things during the walk-through. Members should be encouraged to ask questions, take notes, and begin drawing a process flow diagram.

- Does the facility show signs of poor housekeeping (e.g. cluttered walkways, unswept floors, uncovered drums?)
- Where do you notice waste being generated from processes in the facility (e.g. dripping water or steam, leaks, spills, evaporation, drag-out?)
- Is there discolouration or corrosion on walls, work surfaces, ceiling and walls or pipes? This may indicate system leaks or poorly maintained equipment.
- Where do you see smoke, dirt, or fumes to indicate material losses?
- Do you smell strange odours, or experience eye, nose or throat irritation when you first enter the workplace? These symptoms might indicate system leaks.
- Are there open containers stacked drums, shelving too small to properly handle inventory, or other indicators of poor storage?

- Are all containers labeled as to their contents?
- Is emergency equipment (fire extinguishers, spill kits, phones) available and visible to ensure rapid response to a fire, spill, or other incident?
- Is scrap, or off-specification parts lying around?
- Check inventory. Is any out dated stock, or materials still in storage that are no longer used? Is stock managed by "First in-First out" procedures?

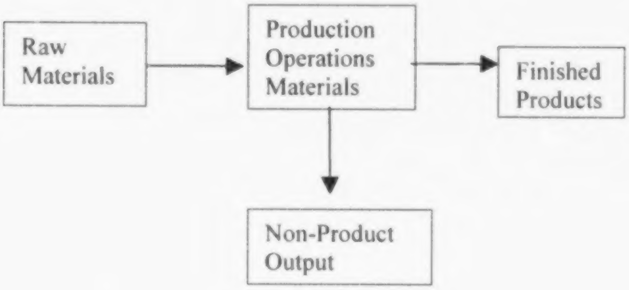
(from *Planning for Profits: A guide to Pollution Prevention for Indiana Businesses.* August 2001.)

A process flow diagram will assist in clarifying a production process for the Green Team. The diagram should show the steps in a process and include all the inputs and outputs of each step including raw materials, materials used in the process, waste, and final products. Flow diagrams may be very simple or more complex depending on your process. The following ideas may assist you in your efforts to develop a diagram:

- Facility plans and process diagrams may already be available and can provide a good start to your diagram
- Identify each step (production, processing or servicing action) in your process
- Identify all the materials and inputs to each step in your diagram.
- Identify all the outputs including wastes and emissions.
- If your process is straight forward, one process diagram should be sufficient
- If your process is complex, start with a simple facility diagram and then divide the process into independent process steps. Draw a process flow diagram for each of these steps.
- You can add additional information to the diagram to make it more useful but be careful not to make it too confusing. You may want to add quantities of materials or focus on a specific chemical or material of concern and track it through the flow diagram.
- Discharge streams can be labeled periodic, intermittent, or continuous.
- Processes may be labeled periodic, batch or continuous.
- Make note of in-house reuse or recycling of materials.

The process flow diagram provides the Green Team with additional information for their assessment of pollution prevention opportunity areas. The following are examples of simple and more complex process flow and material flow diagrams.

Simple process flow diagram can be represented as:



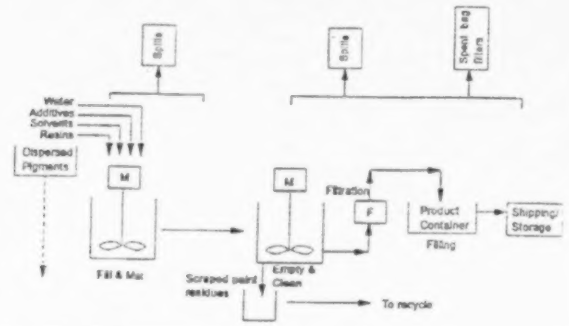
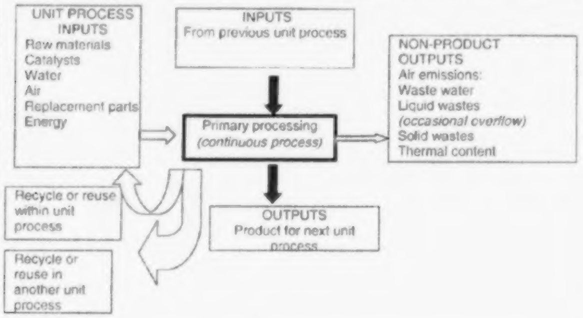


Figure 5-3: Process Flow Diagram for Paint Manufacturing

Process Flow Diagram for Paint Manufacturing

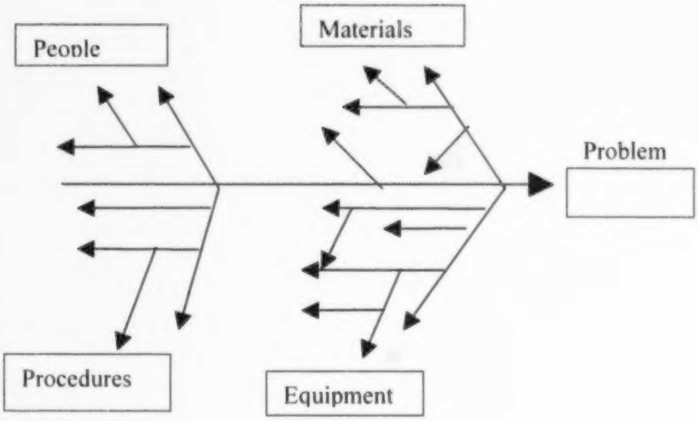
Figure 5-5: Generic Material Flow Diagram For Primary Processing Stage
(Environment Canada (consultation draft 2000 05 24). Pollution Prevention Planning Handbook)



A useful exercise that Green Teams may want to complete subsequent to the identification of problem areas is the **Cause and Effect Diagram or Fishbone diagram**. It is a team exercise to assist in the identification of the root causes of a problem. Once the source(s) of a problem are identified it is easier to identify possible solutions. The group must remember to focus on identifying the "cause" and not try to solve the problem at this stage. After you have completed the fishbone diagram and identified the sources of a problem, it will be easier to identify the solutions or the pollution prevention options.

This exercise is completed by transferring the following fish diagram to a white board of large piece of paper and following these instructions:

1. Identify the problem and write it down in the fish head location.
2. List the 4 main cause categories – materials, people, procedures, equipment
3. Brainstorm potential causes of the problem
4. Decide as a group where to place them (under what category) on the Cause and Effect Diagram
5. Review each major cause category and identify the most likely causes on the diagram
6. Review the causes and ask "Why is this a cause?" (Asking "why" will help get to the root cause of the problem)
7. Reach an agreement on the most probable cause(s) through prioritization



After identifying the root causes for a problem, the team should try to solve the problem by thinking about these causes. A group exercise called "brainwriting", a brainstorming-on-paper exercise, can generate many pollution prevention ideas. And keep in mind, "The only way to find a good pollution prevention alternative is to have many pollution prevention alternatives."

R. Pojasek, Pojasek & Associates

Instructions for the brainwriting technique are:

1. Identify the problem
2. Team members sit around a table
3. Prepared sheets of paper are placed face-up in the centre of the table (one more sheet than there are people around the table). The sheet template follows these instructions.
4. Each team member takes a sheet and silently adds 2 of his or her options/alternatives (solve the problem, make it less severe)
5. Return sheet to pile, take different sheet, add 2 more options
6. Repeat until ideas are exhausted, then read alternatives other members have written and build on those if possible.

When you are using this technique keep the following in mind. Do not overlook the obvious; look in avoided places; provocative ideas may not be realistic but may tweak a good idea; and build on the ideas of others.

Template for Brain-Writing Exercise – Identify Pollution Prevention Options

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.

When everyone has exhausted their ideas, record all the pollution prevention ideas on one sheet of paper.
The next step is to prioritize the ideas, one way of doing this is to use the "Bubble-Up, Bubble-Down" method. The easy steps for this method are:

1. The Green Team randomly lists all the pollution prevention ideas in the brainwriting exercise on one piece of paper. Cut-up the ideas so each option is on its own piece of paper. Lay out the pieces on a table or on the floor.
2. As a group, compare the first two options on the list. Which is best? (think and discuss effectiveness, ability to implement, cost).
3. The preferred option stays/moves to top of list ("bubbles-up").
4. Continue by comparing the next unique pair of options. As options "bubble-up", they become part of new pairs to be compared (if option 6 is preferred over 5, is it preferred over 4, over 3, etc. If it isn't preferred/doesn't bubble-up, go to the next new pair. Now is the time to ask questions and combine options but do not eliminate any options. Consensus is not required on every item.
5. The Exercise is complete when the team agrees to the relative position of all the options. No options are eliminated.

Generally, the cheap and easy-to-implement options bubble-up and the more expensive, longer-term options bubble-down (both may be effective). The quick wins at the top are important. Implementing these options early can ensure greater success for the Team and it helps the Team in gaining momentum. The option that is closest to the top but not a quick win is often the "Cadillac" of solutions. This option may require more time, study (feasibility assessment) and capital investment. One suggestion is to consider action plans for both the quick wins and the "Cadillac" solution.

To illustrate the effectiveness of this method, the following is a list of options for car washing after bubble-up / bubble-down. Notice the easy-to-do items at the top and the more expensive or more elaborate options in the middle and the non-practical solutions at the bottom.

Bubble-up/Bubble-down for vehicle washing

Simply reduce the soap input in the car wash
Use high-pressure water instead of soap
Alter the soap application step
Use degradable soap
Install a closed-loop system
Use alternative cleaning materials
Use a local, off-base car wash
Use rental cars instead of owning/maintaining
Locally treat the water before discharge to sewer
Drive less, walk more, use bicycles
Reuse dirty soapy water
Install a new/improved car wash
Use a softening agent to take the soap out of the water
Handwash the cars
Use ultrafiltration to filter the water
Dry-clean the cars
Use ultrasonic cleaning
Ablative paint for cars
Use dirt-coloured cars
Paint the cars with slippery paint
Do not clean the cars at all
Buy new cars constantly

From: "An Organizational Guide to Pollution Prevention – US EPA, Office of Research and Development

Communications:

Co-workers and management may need to be convinced that pollution prevention will be successful. There may be limited resources to fund a large, long-term project. With these signals, it may be best for a committee to begin by setting easily achievable pollution prevention projects, and then becoming more ambitious as confidence and expertise are gained. On the other hand, some people will want to see big projects with significant impact early on to give credibility to the pollution prevention planning efforts. The committee (and company) will need to judge whether short-term, easy-to-achieve objectives best suit your workplace culture, or whether a longer term approach can be used.

It will be important to quantify the payback associated with capital investments, so that everyone understands the financial benefits of environmental responsibility. Manufacturing firms can also scrutinize their production processes.

As staff become increasingly aware of the cost and environmental benefits and the ease of implementation, suggestions for improvements are likely to be forthcoming. Some companies offer rewards to their employees for suggesting environmental improvements that could save the company money.

Successful Teamwork
Remember these key components of getting and keeping staff participating in environmental programs:

- Define the intentions of the program
- Keep the program simple and convenient for staff
- Communicate the program clearly
- Hold information sessions, share your progress, and ask for feedback

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Appendix G

Environmental Accounting - Determining Your Environmental Costs

For managers and CEO's to fully understand the impact that environmental issues have on the company, a tool is required to separate these costs directly in the accounting system. Environmental accounting is one tool that, if executed correctly, provides information that allows companies to uncover direct and indirect environmental costs.

Do you think that you'll eventually run out of financially successful P2 ideas? *Not likely, based on the Dow Chemical case. In response to rising energy prices, their Louisiana plant started an Energy Contest in 1981 to reduce energy use with projects that provided a minimum of 100% return on investment (ROI). In the first year, 27 winning projects were selected costing $1.7 million to implement, but the ROI was 173%! While the results were impressive, employees felt like all the opportunities were tapped at that point. But, the following year's contest had 32 winners at a cost of $2.2 million and a ROI of 340%. The contest was expanded to include waste reduction in year three and the success of the program continued. After 12 years, Dow had implemented 936 projects with ROIs averaging between 97 and 470%. An audit of 575 projects confirmed savings of over $110 million per year. Dow attributes its success with energy and waste reduction to creating an environment of teamwork and cooperation among plants that continually builds momentum towards bigger and better projects with higher ROIs. From: "Making Business Sense of Energy Efficiency and Pollution Prevention" 1998. American Council for an Energy-Efficient Economy*

In the past, environmental issues often did not enter the priority list of management before they showed up as liabilities in the accountant's books. Today the reality has changed, and environmental costs are becoming more important. For example, an oil tank spill or rupture can incur hundreds of thousands of dollars in clean-up costs. But how can a company determine what their environmental costs are, or how can it decide on a new pollution prevention technology?

Definition - Environmental Accounting

Financial accounting is typically designed to present information to external stakeholders like investors, lenders and others (Schaltegger et al 1996 and USEPA 1995). The objective of financial accounting is to recognize, measure and disclose environmentally related economic impacts in financial accounting. Environmental accounting can be defined "as a sub-area of accounting that deals with activities, methods and systems for recording, analyzing and reporting environmentally induced financial impacts and ecological impacts of a defined economic system" such as a business (Schaltegger et al 1996 page 5).

Environmental accounting is a tool that helps companies to organize their accounting system, in order to understand there true environmental costs. Environmental information must identify direct costs of each environmental impact, in a way that environmental costs of each process can be easily distinguished. As an example, direct monetary value of waste disposal, the consumption of raw material, or labour and energy costs must be clearly presented (OECD 2000).

Benefits of Using Environmental Accounting

The uses of environmental accounting are wide and very important. Some of the benefits that a company can expect if environmental accounting is implemented can be:

- An improvement in the management of resources
- Reduction of potential environmental liabilities
- Reductions of operational costs
- Enhancement of the corporate image
- Attracting investment funds from the financial sector
- Environmental certification may become easier
- Better economical results

Examples of Environmental Costs Incurred by Firms

(Table from "An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms". EPA Office of Pollution Prevention and Toxics. June 1995)

Potentially Hidden Costs

Regulatory	**Up-front**	**Voluntary (Beyond Compliance)**
Notification	Site studies	Community relations/outreach
Reporting	Site preparation	Monitoring/testing
Monitoring/testing	Permitting	Training
Studies/modelling	R&D	Audits
Remediation	Engineering and procurement	Qualifying suppliers
Record-keeping	Installation	Reports (e.g. annual environmental reports)
Plans		Insurance
Training	**Conventional Costs**	Planning
Inspections	Capital Equipment	Feasibility studies
Manifesting	Labour	Remediation
Labelling	Supplies	Recycling
Preparedness	Utilities	Environmental studies
Protective equipment	Structures	R&D
Medical Surveillance	Salvage value	Habitat and wetland protection
Environmental insurance		Landscaping
Environmental assurance		Other environmental projects
Pollution control	**Back-end**	Financial support to environmental groups and/or researchers
Spill response	Closure/decommissioning	
Stormwater management	Disposal of inventory	
Taxes/fees	Post-closure care	
	Site survey	
	Contingent Costs	
Future compliance costs	Remediation	Legal expenses
Penalties/fines	Property damage	Natural resource damages
Responses to future releases	Personal injury damage	Economic loss damages

	Image and Relationship Costs	
Corporate image	Relationship with professional staff	Relationship with host communities
Relationship with customers	Relationship with workers	Relationship with lenders
Relationship with investors	Relationship with suppliers	Relationship with regulators
Relationship with insurers		

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